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Nigromnia, a new genus of Goodeniaceae

By R. C. Carolin*

Abstract

Nigromnia globosa Carolin, gen. et sp. nov., is described and discussed. Allied to *Scaevola* sens. str., it is distinguished by an indumentum of simple hairs, yellow flowers arranged in dense clusters, and an ovary containing a single ovule. It is endemic in the Geraldton region of Western Australia.

Nigromnia Carolin gen. nov.

Suffrutices ramosi compacti. Caules tomentosi pilis simplicibus. Folia tomentosa Flores in fasciculis globosis villosis dispositi. Corolla flava palmata lobis aequalis. Stamina epigynia antheris liberis. Ovarium inferius uno loculo unoque ovulo. Fructus desiccatus indehiscens. Semina ellipsoidea testa chartacea. Embryo teres.

Branched, compact *shrubs*. *Stems* tomentose-pubescent with mostly simple hairs. *Leaves* tomentose, entire, petiolate, obtuse. *Flowers* arranged in globose clusters in the axils of the upper leaves. *Bracts* densely villous on the inside, oblanceolate to obovate. *Bracteoles* villous towards the apex and somewhat broader than the bracts, both bracts and bracteoles shorter than the flowers. *Corolla* yellow, palmate without an anterior pouch, the lobes equal. *Stamens* epigynous, the anthers free. *Ovary* inferior, 1-locular with 1 ovule, glabrous or nearly so: style curved below the broad-deltoid indusium. *Fruit* a dry, indehiscent, inferior, nut crowned by the persistent calyx rim with a single, ellipsoid, scarcely compressed seed surrounded by a chartaceous testa and containing a $\pm$ terete embryo.

Holotype: *N. globosa* sp. nov., the only species known to date.

Nigromnia globosa Carolin sp. nov.

Suffrutex ad 60 cm altus. *Caules* tomentosi pilis albis vel cinereis. *Folia* obovata vel elliptica 3-6 cm longa 1.5-3 cm lata petiolata tomentosa integra obtusa. *Flores* in fasciculis compactis villosis dispositi. *Bracteae* obovatae vel oblanceolatae 2 mm longae. *Bracteolae* obovatae 2 mm longae. *Sepala* fere obsoleta. *Corolla* flava palmata 2.5-3 mm longa extus pubescens pilis simplicibus et lobis aequalibus sine alis. *Stylus* 1.5 mm longus indusio late obdeltoideo 0.5 mm longo. *Fructus* ellipsoideus 1.8 mm longus seminum unum continens.

Much branched dense *shrub* about 60 cm high. *Stems* tomentose-pubescent with mostly simple hairs which are whitish but becoming grey with age. *Leaves* obovate to elliptic, 3-6 cm long, 1.5-3 cm wide, tapering into a short petiole and a $\pm$ broadened base with a conspicuous tuft of silvery villous hairs in the axil, densely tomentose, entire, obtuse. *Flowers* arranged in dense, villous, globose clusters up to 1.5 cm diam. in the axils of the upper leaves. *Bracts* obovate to oblanceolate, 2 mm long, 0.5-0.8 mm wide, densely villous inside with long hairs. *Bracteoles* obovate, 2 mm long, 1 mm wide, densely villous towards the apex. *Sepals* almost obsolete and represented by a minute $\pm$ lobed rim on the ovary. *Corolla* yellow, palmate but forming a short complete tube near the base, 2.5-3 mm long, pubescent with mostly simple hairs outside and a few multi-cellular and glandular ones, villous inside with numerous retrorse simple hairs; lobes equal, deltoid, 0.5-0.8 mm long, 0.3-4 mm wide, acute, without a wing. *Stamens* with filaments irregularly connate,

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ca. 1 mm long; anthers *ca.* 0·5 mm long. *Style* 1·5 mm long, pubescent; indusium broad-deltoid, 0·5 mm long, 1 mm wide, light brown, pubescent towards the base on the upper surface but almost glabrous below with a slightly curved orifice beset with minute (0·1 mm long) white bristles on both lips. *Fruit* ellipsoid, 1·8 mm long, 1 mm diam., dark grey, ribbed, containing a single seed.

Typification—HOLOTYPE—Between Yuna and Dartmoor, *W. E. Blackall* no. 4833, 20 Sept. 1940 (PERTH). The generic name is a latinization of the collector's name and the specific epithet refers to the globular clusters of flowers.

Specimens examined: 25 mi North of Mingenew, *S. Carlquist* no. 3945, 29 Oct. 1967 (NSW, SYD); 25 miles North of Mingenew, *A. S. George* no. 9214, 17 Oct. 1967 (PERTH, SYD).

Discussion: The genus must be placed fairly close to *Scaevola*. In particular, the palmate flower without an anterior pocket and the indehiscent fruit with a seed which is not compressed, indicate this affinity. However, the reduction of ovules to a solitary one in the ovary is unknown in *Scaevola* sens. str.; those species which have this feature and are placed in *Scaevola* by Krause (1912), are more correctly placed in *Goodenia* (Carolin, 1959). Moreover the smooth simple hairs are known in only one species of *Scaevola* from Hawaii, which is otherwise quite different, and the yellow corolla colour is likewise only known from one complex of tropical *Scaevola* species which are otherwise quite different. The dense clustering of the very small flowers is unknown in *Scaevola*.

Distribution: Geraldton Region, Western Australia.

Habitat: in sandy-loam among *Acacia*—*Melaleuca* scrub, near a saline flat (George 9214).

Acknowledgements

To Dr. L. A. S. Johnson for checking the latin descriptions and loaning material and the Curator of the Western Australian Herbarium for loaning material.

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Notes on *Eucalyptus brachycorys* Blakely and *E. comitae-vallis* Maiden

By M. I. H. Brooker*

Abstract

The taxonomy and distribution of the two Western Australian mallees *E. brachycorys* and *E. comitae-vallis* are discussed. *E. brachycorys* has constricted buds and brown, shallowly-pitted seed. *E. comitae-vallis* has non-constricted buds and grey, deeply-pitted seed. The two taxa have roughly a western and eastern distribution respectively and, as yet, are not known to overlap.

Eucalyptus comitae-vallis was described by Maiden (1923). The type was collected at Comet Vale (J. T. Jutson 239) and this locality was the only one known to Maiden at the time. The species is not referred to again in the "Critical Revision". *E. brachycorys* was described by Blakely (1934) and was apparently based on two specimens collected by Max Koch (Nos. 990, 1608) at Cowcowing. Blakely classified both species in the Series Dumosae in different Subseries neither of which as a whole contains natural groups of eucalypts.

Gardner (1960) who must have seen many more specimens of these species than Blakely, commented on specimens attributed to *E. comitae-vallis* from between Kulja and Bodallin, between Koorda and Wyalkatchem and from Mt Holland and remarked on their characteristically constricted buds with a smaller, narrower operculum. He recognized these forms as *E. brachycorys*.



Figure 1—A seed of *E. comitae-vallis* (7 miles north of Menzies, M. I. H. Brooker 2033).

Figure 2—A seed of *E. brachycorys* (near Dalwallinu, M. I. H. Brooker 1905).

* Forestry and Timber Bureau, Canberra, A.C.T. 2600.

Blakely but appears to have regarded them as a nonspecific variant. Pryor and Johnson (1971) agreed with Gardner on the closeness of the relationship, as "comitae-vallis" and "brachycorys" were placed next to each other as anticipated subspecies in their classification. However, Johnson (1972) revised his opinion and relocated *E. brachycorys* in the Dundasianae.

Natural groups in the Section *Dumaria* are recognizable by seed characters (Carr and Carr 1969, Brooker 1971), and Pryor and Johnson (1971) have devised their classification of the species in the *Dumaria* on this basis. The species of the Series *Torquatae* (e.g. *E. comitae-vallis*) have grey seed with deep, more or less hexagonal pits; those of the Series *Dundasianae* (e.g. *E. brachycorys*) have brown seed with shallow elongate pits (Figs. 1, 2).



Figure 3—Buds of *E. comitae-vallis* (Comet Vale, J. T. Jutson).

Figure 4—Buds of *E. brachycorys* (Cowcowing, M. Koch 1041).

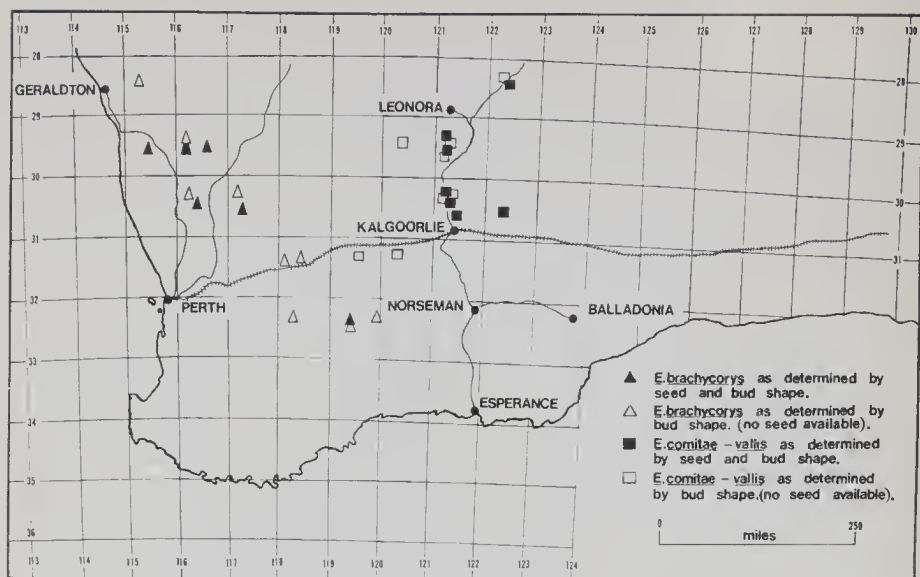


Figure 5—Distribution of *E. comitae-vallis* and *E. brachycorys*.

Another distinction between *E. comitae-vallis* and *E. brachycorys* is that the buds of the former are unconstricted while those of the latter are constricted at the join of the operculum (Figs. 3, 4).

The two species are not known to overlap in distribution (Fig. 5). *E. brachycorys* has a westerly distribution. To the north-west it approaches geographically the related *E. oraria*, and to the south-east the related *E. cylindrocarpa*. By contrast, *E. comitae-vallis* has an easterly distribution. To the north-east it grades into the related *E. concinna*—the difference being that the operculum of the former is usually pointed and that of the latter usually depressed hemispherical.

Acknowledgements

I would like to thank the Photographic section of C.S.I.R.O. Canberra and Mr Norman Hall for the seed and specimen photographs respectively and Mr R. Aronsen of the Forest Research Institute for the map.

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Six new species of *Eucalyptus* from Western Australia

By M. I. H. Brooker*

Abstract

Six new Western Australian eucalypts are described—*E. aquilina* and *E. ligulata* from near Mt. Le Grand, *E. insularis* from North Twin Peak Island (Recherche Archipelago) and from near Mt. Le Grand, *E. calcicola* from near Boranup, *E. brevistylis* from north east of Walpole, and *E. exilis* from Boyagin Rock Reserve, the Mundaring Weir catchment and the Wickepin Reserve. All belong to the sub-genus "*Monocalyptus*".

Eucalyptus aquilina M. I. H. Brooker sp. nov. (Figures 1, 2) Pryor and Johnson code MABCC.

Frutex "mallee" 2–5 m altus, caulibus exilibus, laevibus, eburneis vel canis. *Ramuli* juvenes quadrangulares in sectione transversali. *Glandulae* oleosae in cortice. *Lignotuber* nullum visum.

Cotyledones reniformes, 0·8–1·5 x 1·2–2 cm, ad basin triplinerves, supra virides, infra purpureae. *Folia plantulae* sessilia, decussata, elliptica, 1·5–8 x 1–5 cm, discoloria, marginibus undulatis et glandiferis. *Axis plantulae* verrucosus, glandulosus. *Folia adulta* petiolata, in gemma decussata, demum ab intranodiis separata, lanceolata vel falcata, 8–13 x 1·5–2·5 cm, in acumen longum rectum angustata, viridia, concoloria, leviter nitida, dense reticulata, nervis irregulariter incrassatis. *Glandulae oleosae* parvulae, sparsae, discretiae. *Petoli* complanati, glandiferi, 1–2 (2·5) cm longi.

Inflorescentiae axillares, 3-florae. *Pedunculi* 2–3 x 0·7–1 cm, complanati, erecti alabastra immatura ferentes, recurvi flores et fructus ferentes. *Alabastra* sessilia, turbinata, 2·5–3·5 x 2–3·5 cm. *Operculum* hypanthium aequans vel quam eo brevius, late conicum, apiculatum, crassum. *Stamina* omnia fertilia. *Filamenta* in alabastro fere horizontalia, partim inflexa, valde glandifera. *Antherae* stylum cingentes, oblongae, dorsifixae, versatiles, ab rimis longitudinalibus dehiscences, glandula antherae a tergo manifesta. *Stylus* gradatim angustatus. *Stigma* inconspicuum. *Ovarium* 5–7 loculare. *Ovula* verticaliter 2-seriata.

Fructus sessilis, obconicus, 2–2·5 x 3·5–5 cm, laevis vel parum costatus vel angulatus. *Annulus operculi* latus, concavus. *Discus* latus, rugosus, porphyreus, nitens, super valvas in lobos uncatos 5–18 mm elevatos extensus. *Valvae* 5–7, pro parte maxima ab lobis disci tectae, apicibus liberis sursum versis.

Senem pyramidale, nigrum, 2–3 x 2 mm, rotundatum, latere dorsali lacunoso, ventrali cum porcis aliquot ad hilum ascendentibus. *Ovulodia* oblonga, fulva vel porphyrea.

Type: near Mt Le Grand, Western Australia (33°59'S, 122°08'E) 22 April 1972, M. I. H. Brooker 3622 (holo: FRI; iso: PERTH, K, NSW, AD, MEL, GAUBA).

A mallee 2–5 m tall with slender, creamy-white or grey, smooth stems. Young *branchlets* flattened. *Bark* glandular. *Lignotuber* not seen.

Cotyledons reniform, 0·8–1·5 x 1·2–2 cm, triplinerved at the base, green above, purple below. *Seedling leaves* sessile, decussate, elliptical, 1·5–8 x 1–5 cm, discolorous, edges undulate and glandular. *Seedling axis* verrucose, glandular. *Adult leaves* petiolate, decussate in bud, separated on the mature axis by intranodes, lanceolate or falcate, 8–13 x 1·5–2·5 cm, narrowing to a long straight point, green, concolorous, slightly glossy. *Reticulations* dense, irregularly thickened. *Oil glands* small, sparse, discrete. *Petiole* flattened, glandular, 1–2 (2·5) cm long.

Inflorescences axillary, of 3 buds. *Peduncles* 2–3 x 0·7–1 cm, flattened, erect with immature buds, recurved with flowers and fruit. *Buds* sessile, turbinate, 2·5–3·5 x 2–3·5 cm. *Operculum* equal to or shorter than hypanthium,

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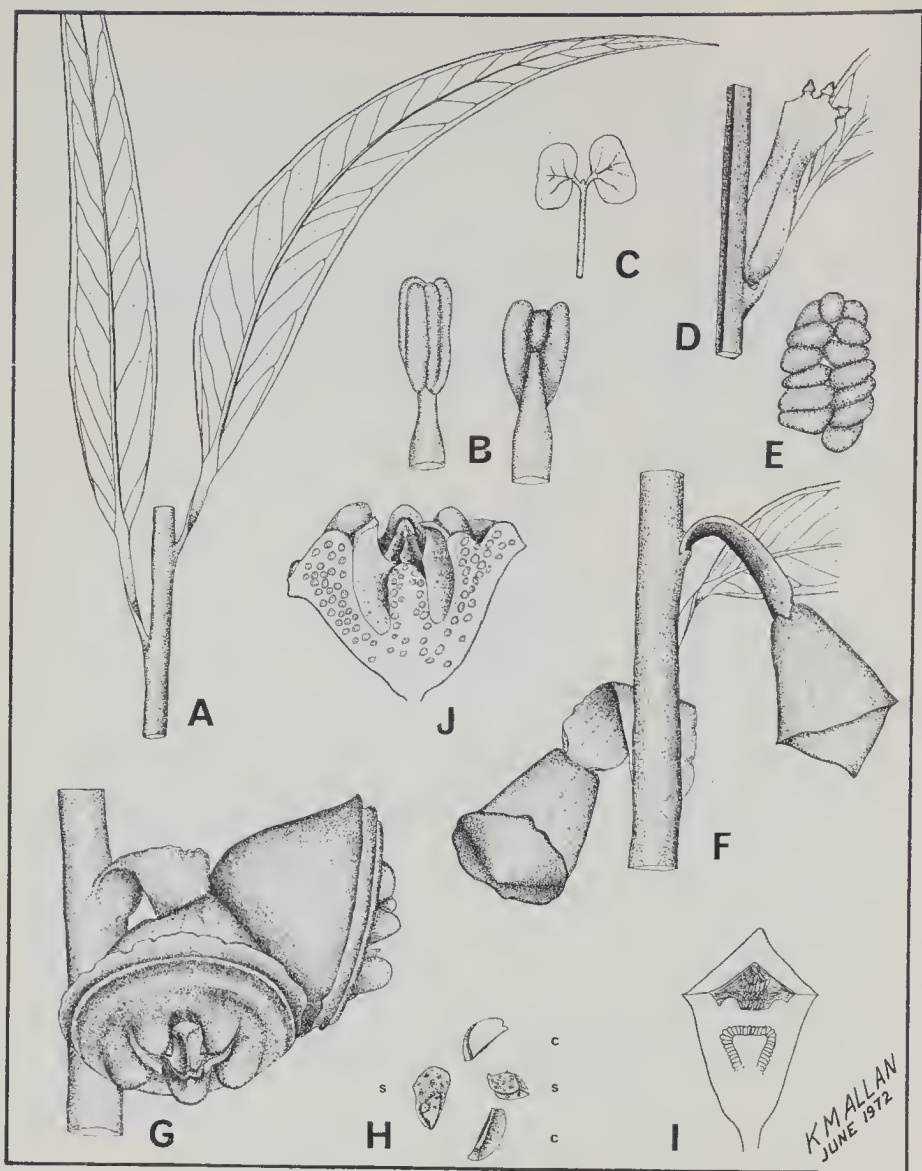


Figure 1—*Eucalyptus aquilina* sp. nov. A—Leaves, x 1. B—Anthers, x 8. C—Cotyledons, x 0.75. D—Young buds, x 1. E—Ovules, x 5. F—Buds, x 1. G—Fruit, x 1.25. H—Seed, x 5. I—Bud section, x 1. J—Fruit section, x 1.25.

broadly conical, apiculate, thick. *Stamens* all fertile. *Filaments* almost horizontal in bud, partially inflected, strongly glandular. *Anthers* surrounding the style, oblong, dorsifixed, versatile, opening by longitudinal slits; gland visible from the back. *Style* tapering. *Stigma* inconspicuous. *Locules* 5-7. *Ovules* in 2 vertical rows.

Fruit sessile, obconical 2-2.5 x 3.5-5 cm, smooth or faintly ribbed or angled. *Operculum* scar broad, concave. *Disc* broad, rugose, red-brown, shining, extending over the valves as hooked lobes raised 5-18 mm. *Valves* 5-7, mostly obscured by lobes of disc, free tips upturned.

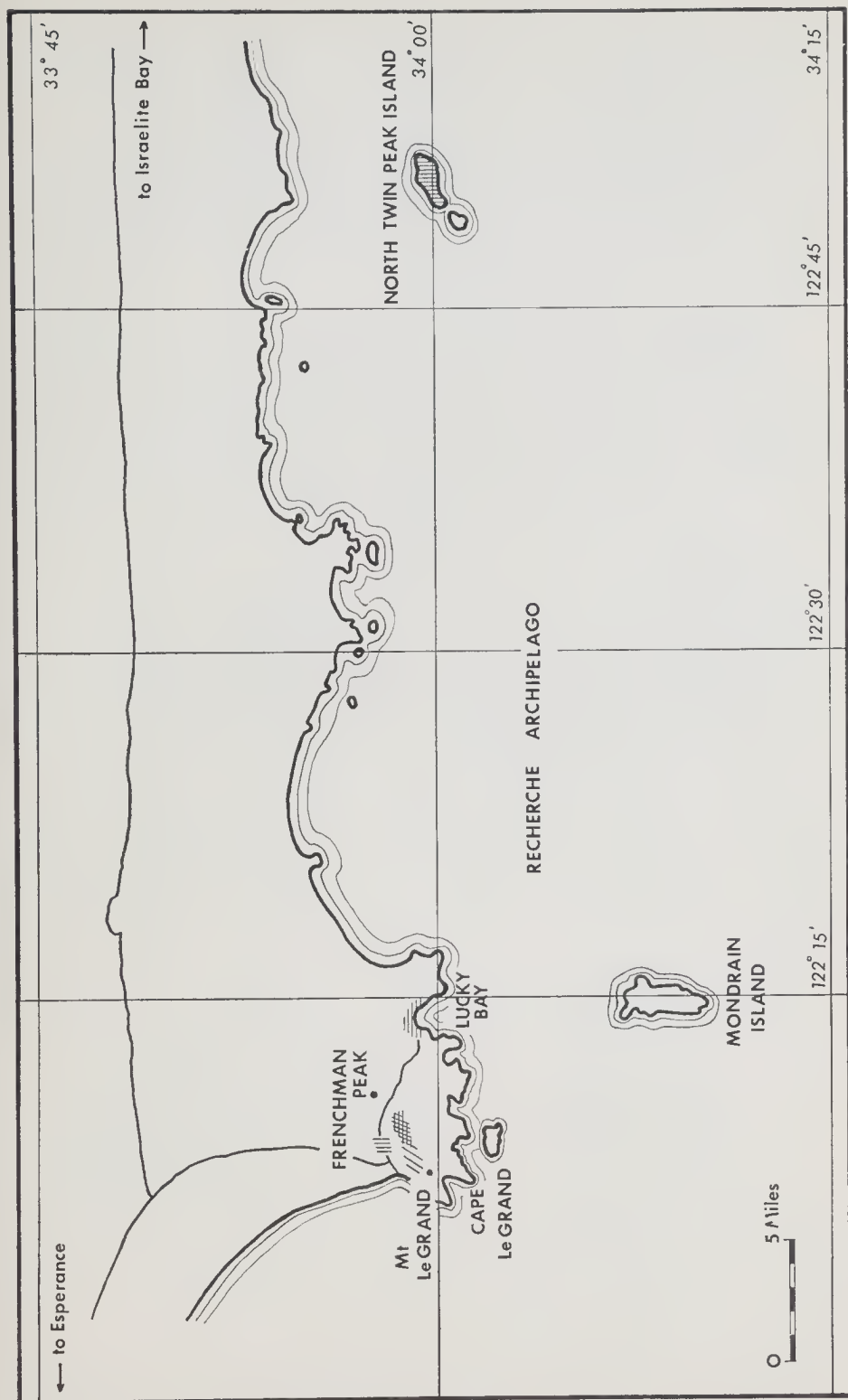


Figure 2—Distribution of *Eucalyptus aquilina* sp. nov. (oblique hatching); *E. ligulata* sp. nov. (horizontal hatching); and *E. insularis* sp. nov. (vertical hatching).

Seed pyramidal, black, 2–3 x 2 mm; rounded, lacunose on dorsal side with ribs ascending to the hilum on the ventral side. *Chaff* elongate, yellow brown or red brown.

Distribution: Western Australia, among hills near Mt Le Grand.

Other collections: various localities near Mt Le Grand and between Mt Le Grand and Frenchmans Peak, Western Australia: 7 Oct. 1966, *P. G. Wilson* 5570 (PERTH); 16 Aug. 1971 *A. S. Weston* 6748 (PERTH); 5 Nov. 1971, *A. S. Weston* 7017 (PERTH, FRI, NSW, AD, MEL); 13 Nov. 1971, *A. S. Weston* 7239 (PERTH); 15 Mar. 1972, *K. M. Allan* 821 (PERTH, FRI, NSW, AD, MEL) and 22 April 1972, *M. I. H. Brooker* 3611 (FRI, PERTH, GAUBA, BRI, NSW).

Flowering period: May–October.

The specific epithet alludes to the hooked lobes of the disc.

Eucalyptus aquilina is a species with affinity to *E. coronata* C. A. Gardn. but differing in the larger buds and fruit, the practically unribbed hypanthia, the unbeaked, unribbed conical opercula and the larger, more conspicuously lobed discs. It grows in shallow soil amongst gneissic rocks on creeksides. The type comes from the steep bank of a creek flowing north from a saddle on the west side of Mt Le Grand. Associated eucalypts are *E. doraloxylon* F. Muell., *E. aff. goniantha* Turcz. and *E. ligulata* M. I. H. Brooker sp. nov.

***Eucalyptus ligulata* M. I. H. Brooker sp. nov.** (Figures 2, 3) Pryor and Johnson code MABEL.

Frutex "mallee" 2–3 m altus. *Cortex* canis vel cinereus, laevis, glandifer. *Ramuli* juvenes quadrangulares vel complanati in sectione transversali. *Lignotuberum* formans.

Cotyledones reniformes, 7–10 x 10–15 mm, ad basin triplinerves, supra virides, infra purpureae. *Folia plantulae* sessilia, decussata, amplexicaulia, elliptica vel ovata, 1.5–10 x 1–4.5 cm, viridia, leviter discoloria. *Folia adulta* petiolata, in gemma decussata, denum ab intranodiis separata, lanceolata, erecta, aliquot uncinata, 5–10 x 0.8–2.5 cm, viridia, concoloria, moderate dense reticulata. *Glandulae oleosae* ambitu irregulares, in dimensione variabiles, aliquot per areolam. *Petioles* valde complanati, aliquot torti, 8–20 mm longi.

Inflorescentiae axillares 7–11 (14) florum, profusae, multae in axillis inferioribus aphyllis. *Pedunculi* 7–25 mm longi, complanati. *Alabastra* clavata, 9–15 x 4–6 mm, costata vel striata, in pedicellis 4–10 mm longis angustata. *Operculum* hypanthio longius et latius, interdum rostratum, stramineum vel brunneum tempore exutum. *Stamina* omnia fertilia. *Filamenta* exteriora erecta, interiora radiale inflexa. *Antherae* stylum cingentes, oblongoreniformes, dorsifixae, versatiles, ab rimis longitudinalibus vel semi-obliquis dehiscentes, glandula terminali magna. *Stylus* gradatim angustatus. *Stigma* inconspicuum. *Ovarium* 3-loculare. *Ovula* verticaliter 2-seriata.

Fructus pedicellatus, globularis vel ovoide-truncatus, 8–15 x 9–14 mm, rugosus, leviter costatus. *Cicatrix operculi* angustata. *Discus* prominens, porphyreus, variabilis, declivis vel leviter convexus. *Valvae* 3, depressae, obscurae.

Semen pyramidale, nigrum, 3 x 2 mm, rotundatum, latere dorsali striato et lacunoso, ventrali cum porcis aliquot ad hilum adscendentibus. *Ovnlodia* breviora, flavi-brunnea et porphyrea.

Type: About 1½ miles east of the beach near Cape Le Grand, Western Australia (33°58'S, 122°90'E) 15 Mar. 1972, *K. M. Allan* 820 (holo: PERTH; iso: FRI, K, NSW).

A mallee 2–3 m tall. *Branchlets* quadrangular in cross section or flattened. *Bark* grey to light grey, smooth, glandular. Capable of forming lignotubers.

Cotyledons reniform, 7–10 x 10–15 mm, triplinerved at the base, green above, purple below. *Seedling leaves* sessile, decussate, amplexicaul, elliptical to ovate, 1.5–10 x 1–4.5 cm, green, slightly discolorous. *Adult leaves* petiolate, decussate in bud finally separated by intranodes, lanceolate, erect, some uncinata, 5–10 x 0.8–2.5 cm, green, concolorous, moderately densely reticulate. *Oil glands* irregular in outline, variable in size, several per areole. *Petioles* strongly flattened, some twisted, 8–20 mm long.

Inflorescences prolific, axillary, of 7–11 (14) buds, many in lower leafless axils. *Peduncles* 7–25 mm long, flattened. *Buds* clavate, 9–15 x 4–6 mm, ribbed

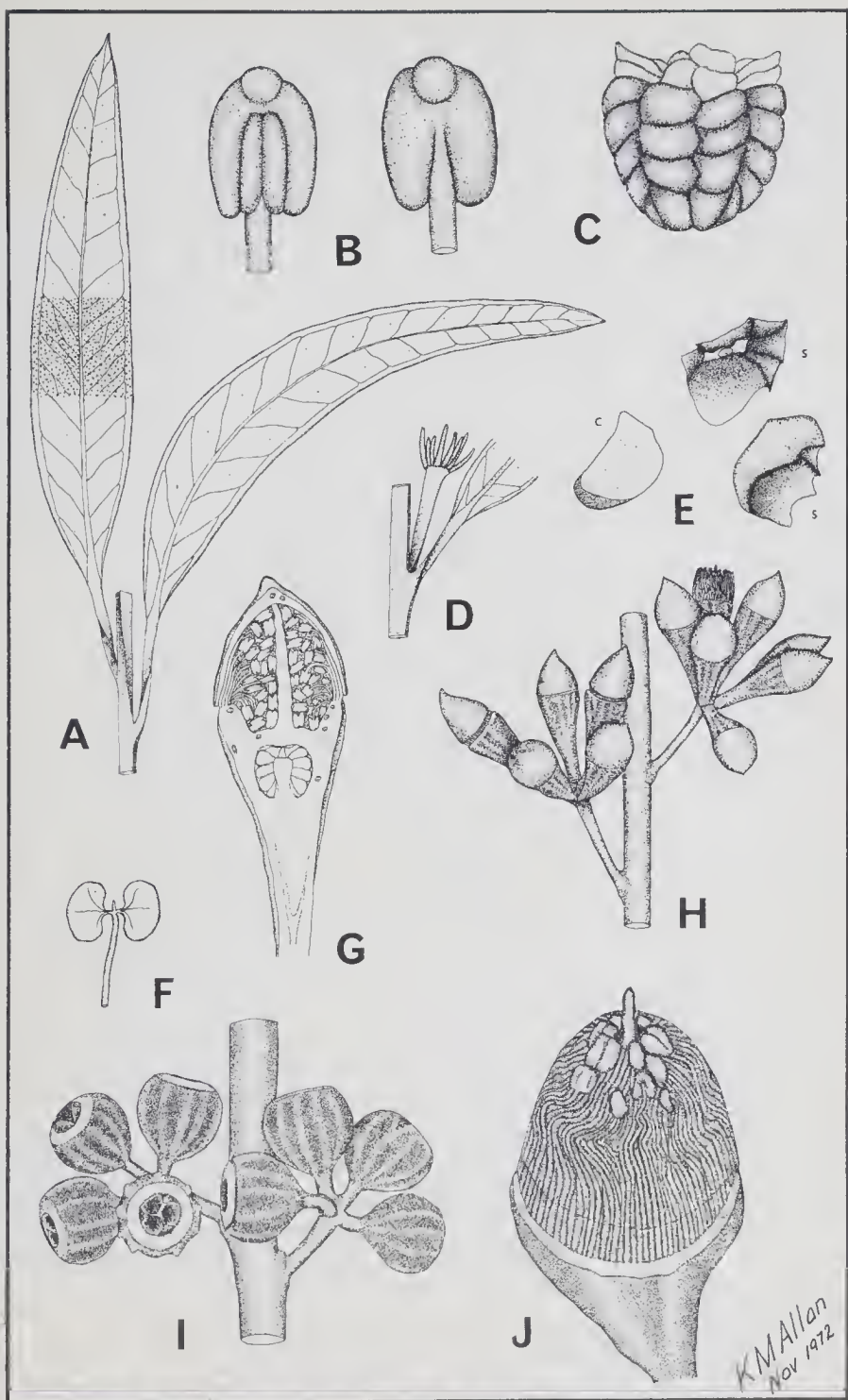


Figure 3—*Eucalyptus ligulata* sp. nov. A—Leaves, $\times 1$. B—Anthers, $\times 25$. C—Ovules, $\times 8$. D—Young buds, $\times 1$. E—Seed, $\times 5$. F—Cotyledons, $\times 0.75$. G—Bud section, $\times 2.5$. H—Buds, $\times 1$. I—Fruit, $\times 1$. J—Bud with operculum removed, $\times 6$.

or striate, tapering into the pedicel 4–10 mm long. *Operculum* longer and wider than hypanthium, sometimes beaked, yellow or brown when shed. *Stamens* all fertile. Outer *filaments* erect, inner ones inflected radially. *Anthers* surrounding the style, oblong-reniform, dorsifixed, versatile, opening by semi-oblique or longitudinal nonconfluent slits; gland large, terminal. *Style* simple, stigma inconspicuous. *Locules* 3. *Ovules* in 2 vertical rows.

Fruit pedicellate, globular or ovoid-truncate, 8–15 x 9–14 mm, wrinkled and shallowly ribbed. *Operculum* scar narrow. *Disc* conspicuous, red-brown, variable, inward sloping to slightly convex. *Valves* 3, sunken, obscure.

Seed pyramidal, black, 3 x 2 mm, rounded, striate and lacunose on dorsal side, with ribs ascending to the hilum on the ventral side. *Chaff* smaller, yellow-brown and red-brown.

Distribution: Western Australia, near Mt Le Grand, Lucky Bay, and Hauloff Rock.

Other collections: same locality as type: 16 Aug. 1971, *A. S. Weston* 6747 (PERTH); 16 Aug. 1971, *A. S. Weston* 6750, 6751 (PERTH); 5 Nov. 1971, *A. S. Weston* 7030 (PERTH, FRI, NSW); 15 Mar. 1972, *K. M. Allan* 822 (PERTH, FRI, AD); 22 April 1972, *M. I. H. Brooker* 3609, 3610, 3616 (FRI, PERTH, K, MEL, GAUBA, NSW); Lucky Bay, Western Australia (33°49'S, 122°13'E) 14 Aug. 1971, *A. S. Weston* 6637 (PERTH); 3 miles north-west of Hauloff Rock (ca. 50 miles north-east of Albany), 29 Jan. 1973, *K. Newbey* (PERTH, FRI).

Flowering period: March–June.

The specific name alludes to the marked flattening of the petioles and peduncles.

Eucalyptus ligulata grows in close association with *E. aquilina* M. I. H. Brooker sp. nov. and *E. affinis goniantha* Turcz. and has only been found in the localities cited above. It is allied to *E. calcicola* M. I. H. Brooker sp. nov. The natural affinity of these two species is not clear but they could be placed with *E. acies* M. I. H. Brooker.

Eucalyptus calcicola M. I. H. Brooker sp. nov. (Figures 4, 5). Pryor and Johnson code MABEN.

Frutex “mallee” usque ad 2·5 m altus. *Ramuli* juvenes complanati vel quadrangulares in sectione transversali. *Cortex* cinereus vel viridi-cinereus, laevis, glandifer. *Lignotuberum* formans.

Cotyledones reniformes, ca. 10 x 15 mm, triplinerves, supra virides, infra purpureae. *Folia plantulae* sessilia, decussata, ovata, 2–8 x 1–6 cm, tenuia, viridia, vivida nitentia discoloria. *Folia juvenilia* sessilia, decussata, amplexicaulia, ovata, cuspidata, 5–9 x 3–7 cm, viridia vivida nitentia, leviter discoloria. *Folia adulta* petiolata, in gemma decussata, demum ab intranodiis separata, lanceolata vel falcata, 5·5–10·5 x 1–3 cm, viridia, concoloria, moderate dense reticulata. *Glandulae oleosae* numerosae, ambitu irregularissimae, aliquot per areolam. *Petioluli* complanati, aliquot torti, 1–2 cm longi.

Inflorescentiae axillares, 7-florae. *Involucrum* 6-bracteatum. *Pedunculi* complanati, 1–2 cm longi. *Alabastra* turbinata, 10–15 x 6–10 mm, costata. *Pedicelli* 3–5 mm longi. *Operculum* rostellatum vel conicum, 5–8 mm longum, crassum. *Stamina* omnia fertilia. *Filamenta* in gemma exteriora erecta, aliquantum tangentia flexa, interiora radiale inflexa. *Antherae* stylum cingentes, oblongae, dorsifixae, versatiles, ab rimis longitudinalibus non-confluentibus dehiscentes. *Stylus* gradatim angustatus, sculptus. *Stigma* inconspicuum. *Ovarium* 4-loculare. *Ovula* verticaliter 2-seriata.

Fructus breviter pedicellatus, globulari-truncatus, 10–15 x 12–16 mm, costis 1–2 mm altis. *Discus* prominens, annularis, primum obliquus, demum elevatus et planus, 2 mm latus. *Valvae*, 4, depressae.

Semen pyramidale, nigrum, 2–4 x 1–2 mm, latere dorsali rotundato et striato, ventrali cum costis aliquot ad hilum adscendentibus. *Ovulodia* breviora, flavi-brunnea.

Type: Near Cape Freycinet, Western Australia (34°07'S, 115°00'E) 18 June 1971, *K. M. Allan* 634 (holo: PERTH; iso: FRI, K, NSW, AD, GAUBA, MEL, HO, BRI).

A mallee to 2·5 m tall. Young *branchlets* flattened or quadrangular in cross section. *Bark* light-grey or greenish-grey, smooth, glandular. Capable of forming lignotubers.

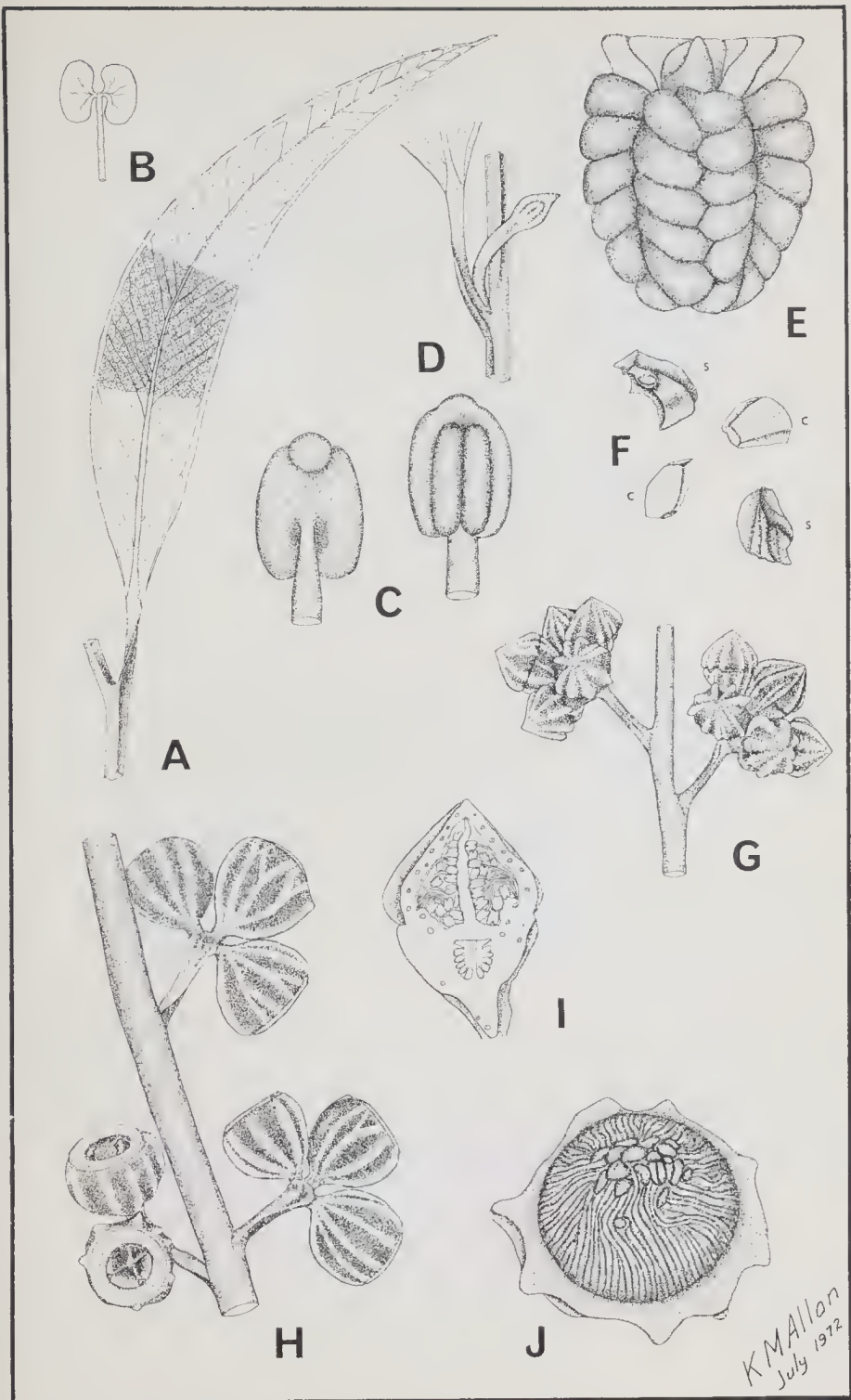


Figure 4—*Eucalyptus calcicola* sp. nov. A—Leaf, x 1. B—Cotyledons, x 1. C—Anthers x 20. D—Young buds, x 1.5. E—Ovules, x 10.5. F—Seed, x 4. G—Buds, x 1, H—Fruit, x 1. I—Bud section, x 2.5. J—Bud with operculum removed, x 4.5.

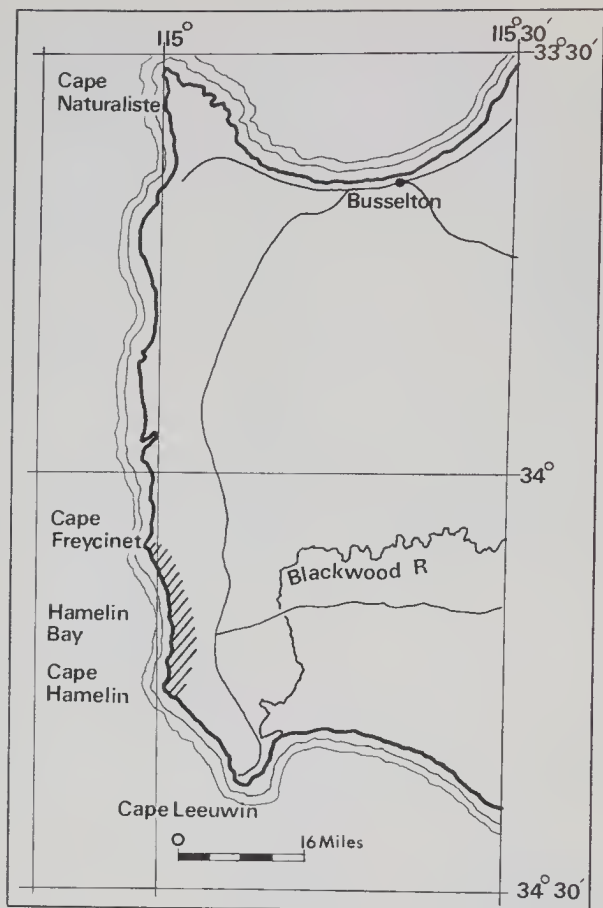


Figure 5—Distribution of *Eucalyptus calcicola* sp. nov. (shaded area).

Cotyledons reniform, ca. 10 x 15 mm, triplinerved, green above, purple below. *Seedling leaves* sessile, decussate, ovate, 2–8 x 1–6 cm, thin, bright shining green, discolorous. *Juvenile leaves* sessile, decussate, amplexicaul, ovate, cuspidate, 5–9 x 3–7 cm, bright shining green, slightly discolorous. *Adult leaves* petiolate, decussate in bud, finally separated by intranodes, lanceolate or falcate, 5.5–10.5 x 1–3 cm, moderately densely reticulate, green, coneolourous. *Oil glands* numerous, very irregular in outline, several per areole. *Petioles* flattened, some twisted, 1–2 cm long.

Inflorescence axillary of 7 buds. Bracts 6. *Peduncles* 1–2 cm long, flattened. *Buds* turbinate, 10–15 x 6–10 mm, ribbed. *Pedicels* 3–5 mm long. *Operculum* beaked or conical, 5–8 mm long, thick. *Stamens* all fertile. *Outer filaments* erect, somewhat flexed tangentially, inner ones inflected radially. *Anthers* surrounding the style, oblong, dorsifixed, versatile, opening in longitudinal non-confluent slits. *Style* tapering, sculptured. *Stigma* inconspicuous. *Locules* 4. *Ovules* in 2 vertical rows.

Fruit shortly pedicellate, globular-truncate, 10–15 x 12–16 mm, with ribs raised 1–2 mm. *Disc* prominent, annular, at first oblique, finally slightly raised and level, 2 mm wide. *Valves* 4, sunken.

Seed pyramidal, black 2–4 x 1–2 mm, rounded and striate on dorsal side with ribs ascending to the hilum on the ventral side. *Chaff* smaller, yellow-brown.

Distribution: Western Australia, coastal dunes between Cape Freycinet and Cape Hamelin, between 100 and 350 feet above sea level.

Other collections: same locality as type: 18 June 1971, K. M. Allau 635 (juvenile leaves) (PERTH, FRI); 8 May 1972, M. I. H. Brooker 3697 (FRI, PERTH, NSW, GAUBA); Boranup, Western Australia (34°08'S, 115°02'E) May 1971, B. Walsh (PERTH, FRI); 30 Jan. 1973, P. Christensen (PERTH, FRI).

Flowering period: May–June.

Eucalyptus calcicola has a restricted distribution on the westerly aspect of massive calcareous dunes near the coast at Hamelin Bay to the south of Cape Freycinet. It occurs as dense clusters of mallees generally emergent above the surrounding sclerophyllous shrubs and frequently on outcropping limestone (the reason for the specific name). Nearby eucalypts are *E. calophylla* R. Br. ex Lindl. and *E. megacarpa* F. Muell. but only *E. calcicola* extends west of these towards the cliff tops. Its affinity is with *E. ligulata* M. I. H. Brooker sp. nov. from which it differs in the broader, more strongly ribbed buds and fruit, and the bright, shining green seedling leaves.

Eucalyptus exilis M. I. H. Brooker sp. nov. (Figures 6, 7) Pryor and Johnson code MADAF.

Frutex "mallee" usque ad 6 m altus, caulibus exilibus erectis. *Ramuli* glauci. Canopium tenue. *Cortex* cinereo-crubescens cinereus vel eburneus, laevis. *Lignotuberum* formans.

Cotyledones reniformes, ca. 10 x 12 mm. ad basin triplinerves, supra virides, infra purpureae. *Folia plantulae* sessilia, decussata, elliptica vel oblonga, 1.5–10 x 1–6 cm, leviter discoloria. *Folia adulta* petiolata, in gemma decussata, demum ab intranodiis separata, lanceolata vel falcata, uncinata, 4–7 x 0.8–2 cm, concoloria. *Reticulum* densum, intersectionibus aliquot irregulariter crassis; glandulae oleosae sparsae; areolae aliquot cum glandula singulare. *Petioles* graciles, complanati, 6–15 mm longi.

Inflorescentiae axillares, 11-florae. *Involucrum* 6-bracteatum. *Pedunculi* erecti, leviter complanati, 8–15 mm longi. *Alabastra* clavata, 6–8 x 4–5 mm. *Pedicelli* 3–5 mm longi. *Operculum* hemisphaericum, interdum apiculatum vel late conicum, hypanthio brevius. *Stamina* omnia fertilia (?). *Filamenta* primum erecta demum radiale inflexa, antheris supra ovarium sitis vel extrinsecus ad discum deflexis. *Autherae* reniformes, dorsifixae, versatiles, ab rimis obliquis dehiscentes, glandula terminali. *Stylus* glandifer, gradatim angustatus, ad basin rugosus, supra striatus, ad apicem flexus. *Ovarium* 4-loculare. *Ovula* verticaliter 2 seriata.

Fructus pedicellatus, ovoideus vel globulari-truncatus, 11–15 x 10–14 mm. *Discus* verticalis. *Valvae* depressae.

Semey pyramidale, 2–3 x 2–3 mm, nigrum, latere dorsali rotundato, ventrali cum porcis aliquot ad hilum adscendentibus. *Ovulodia* breviora, porphyrea.

Type: north-west of Boyagin Rock, Boyagin Rock Reserve, Western Australia (32°27'S, 116°52'E) 10 May 1972, M. I. H. Brooker 3702 (holo: FRI; iso: PERTH, K, NSW, GAUBA).

A mallee to 6 m tall with slender erect stems. *Branchlets* glaucous. Canopy thin. *Bark* pinkish-grey light-grey or creamy smooth. Capable of forming lignotubers.

Cotyledons reniform ca. 10 x 12 mm triplinerved at the base green above purple below. *Seedling leaves* decussate sessile elliptical, 1.5–10 x 1–6 cm, slightly discolorous. *Adult leaves* petiolate, decussate in bud, separated on the mature axis by intranodes, lanceolate or falcate, 4–7 x 0.8–2 cm, uncinata, concolorous. *Reticulation* dense, oil glands sparse, a few areoles with a single gland, a few irregularly thickened reticulation intersections. *Petioles* slender, flattened, 6–15 mm long.

Inflorescences axillary, of 11 buds. Bracts 6. *Peduncles* erect, slightly flattened, 8–15 mm long. *Buds* clavate, 6–8 x 4–5 mm. *Pedicels* 3–5 mm long.

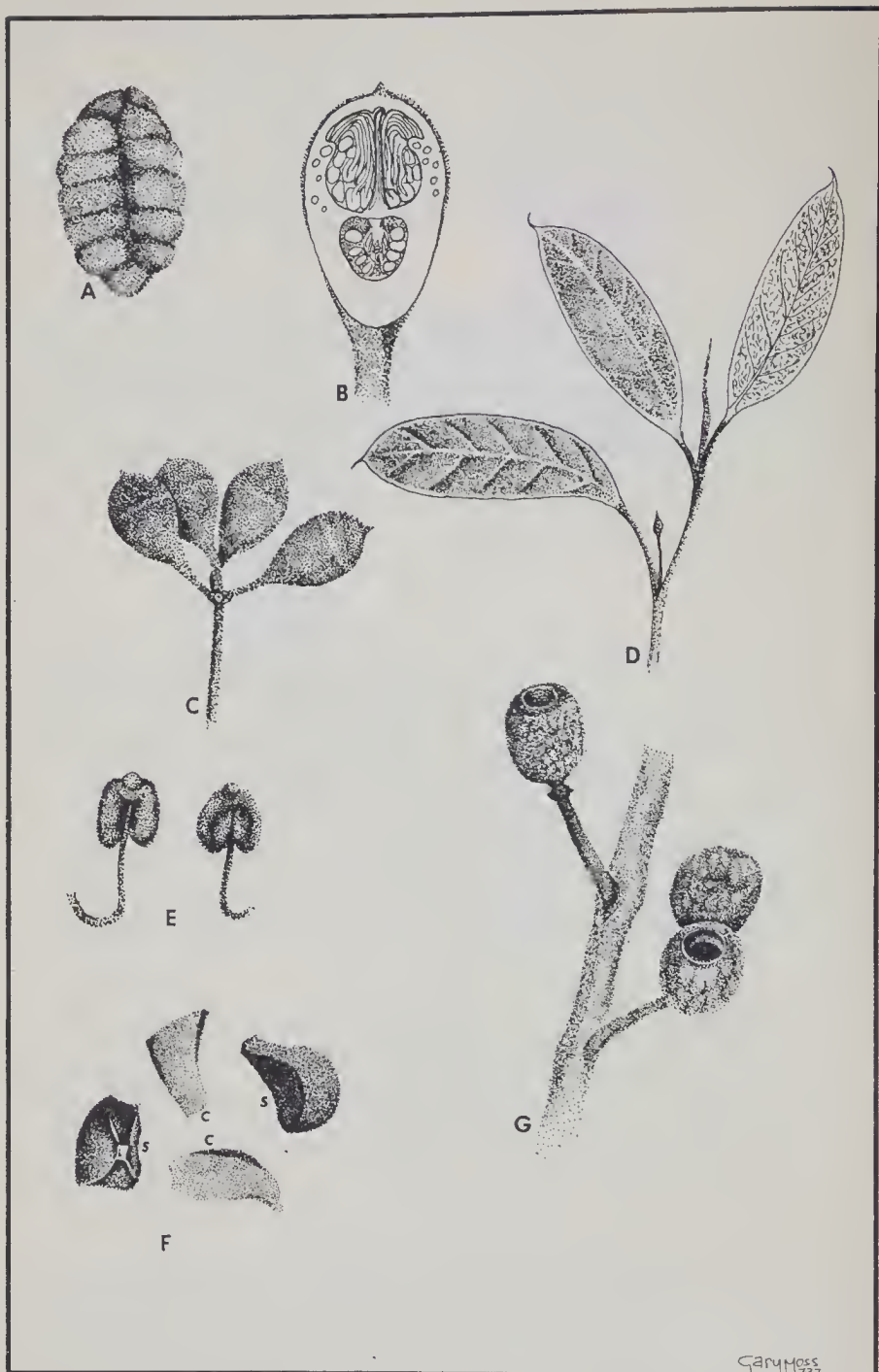


Figure 6—*Eucalyptus exilis* sp. nov. A—Ovules, x 17. B—Bud section, x 6. C—Buds, x 3 D—Leaves, x 1. E—Anthers, x 20. F—Seed and chaff, x 6. G—Fruit, x 1.25.

Operculum hemispherical, sometimes apiculate or broadly conical, shorter than the hypanthium. *Stamens* all fertile (?). *Filaments* at first erect then inflected radially with anthers resting above the ovary or deflected outwards towards the disc. *Anthers* reniform, dorsifixed, versatile, opening by oblique slits, gland terminal. *Style* glandular, tapering, wrinkled at base, fluted above and bent at the top. *Locules* 4. *Ovules* in 2 vertical rows.

Fruit pedicellate, ovoid or globular-truncate, 11–15 x 10–14 mm. *Disc* vertical. *Valves* sunken.

Seed pyramidal, black, 2–3 x 2–3 mm, rounded and striate on the dorsal surface with a few ribs ascending to the hilum on the ventral side. *Chaff* smaller, red-brown.

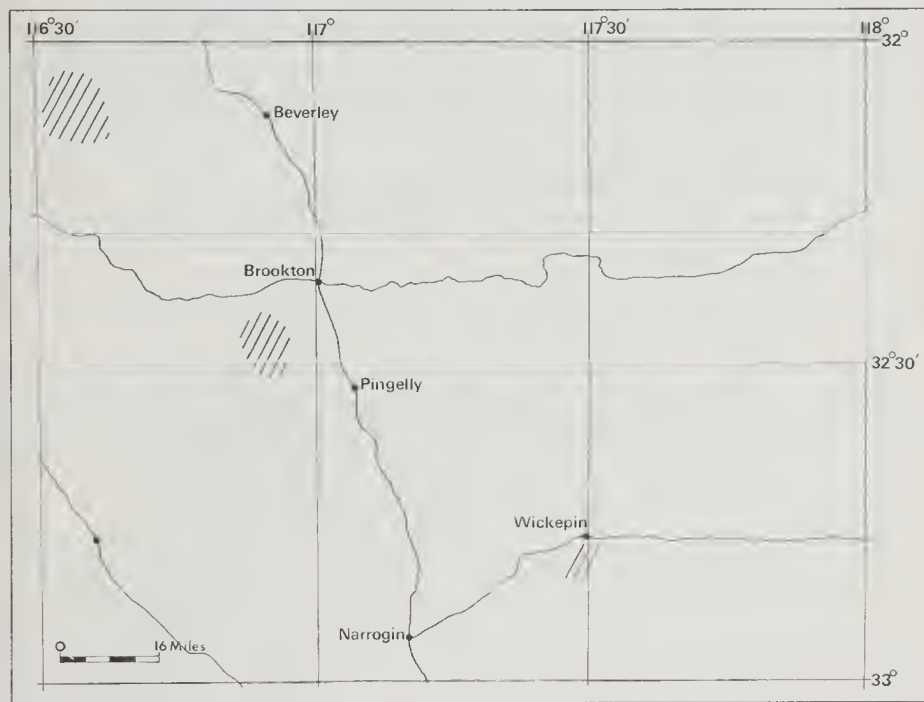


Figure 7—Distribution of *Eucalyptus exilis* sp. nov. (shaded areas).

Distribution: Western Australia, Mundaring Weir Catchment, Boyagin Rock Reserve, and Wickiepin Reserve.

Other collections: at 63 mile peg on the boundary of the Mundaring Weir Catchment area, Western Australia (32°05'S, 116°35'E) 9 July 1952, *D. H. Perry* (PERTH, FRI, K, NSW, MEL); Boyagin Rock Reserve, Western Australia (32°27'S, 116°52'E) 22 June 1961, *H. B. Shugg* (PERTH); Wickiepin Reserve, Western Australia, 22 June 1961, *H. B. Shugg* (PERTH); Boyagin Rock Reserve, Western Australia (32°27'S, 116°52'E), 3 Jan. 1970, *A. S. George* 9815 (PERTH, FRI, AD, MEL, BRI) and 10 May 1972, *M. I. H. Brooker* 3703 (FRI, PERTH).

Flowering period unknown.

The specific name alludes to the slender stems.

Eucalyptus exilis is closely related to *E. pendens* M. I. H. Brooker and *E. sepulchralis* F. Muell., but differs in the erect habit and smaller leaves, buds, and fruit. The localities for *E. exilis* lie half way between those of the other two species. At Boyagin Reserve it occurs on a lateritic podsol and is associated with *E. accedens* W. V. Fitzg. and *E. drummondii* Benth.

Eucalyptus insularis M. I. H. Brooker sp. nov. (Figures 2, 8) Pryor and Johnson
code MADEM.

Frutex "mallee" 1.5–8 m altus. *Caules* exiles (plantae continentales), vel validus (plantae insulares), cortice cinereo, chlorino vel viridi-griseo, laevi, glandifero. Plantae altae cortice basali pro 20 cm porphyreo, fibroso, et ramis ad basin in latere infero conspicue corrugatis. *Ranuli* quadrangulares in sectione transversali. *Lignotuberum* formans.

Cotyledones reniformes, 4–9 x 6–12 mm, ad basin triplinerves, supra virides, infra purpureae. *Folia plantulae* sessilia, decussata, elliptica vel oblonga, denticulata, 1.5–7 x 0.5–3 cm, viridia, discoloria. *Folia intermedia* viridia (insulares) vel glauca (continentales). *Folia adulta* petiolata, in gemma decussata, demum ab intranodiis separata, brevia, erecta, lanceolata, angustilanceolata vel falcata, uncinata, 4.5–7.5 x 0.5–0.8 cm, viridia, concoloria. *Reticulum* sparsum. *Glandulae oleosae* numerosae, ambitu circulares, in dimensione variabiles, per areolam multae. *Petioles* graciles, complanati, supra sulcati, valde glandiferi, 4–8 mm longi.

Inflorescentiae axillares, multiflorae. *Pedunculi* 5–8 mm longi, vulgo recurvi. *Involucrum* 6-bracteatum. *Alabastra* clavata, 4–6 x 2–3 mm. *Pedicelli* 3–5 mm longi. *Operculum* hemisphaericum, apiculatum, hypanthio brevius et parum angustius. *Stamina* omnia fertilia. *Filamenta* primum erecta, demum radiale inflexa. *Antherae* oblongae, dorsifixae, versatiles, ab rimis nonconfluentibus longitudinalibus vel obliquis dehiscentes, glandula terminali. *Stylus* gradatim angustatus. *Stigma* inconspicuum. *Ovarium* 3-loculare. *Ovula* verticaliter 2-seriata.

Fructus pedicellatus, ovoideus, 7–8 x 5–6 mm, leviter rugosus. *Discus* supra obliquus tum verticaliter declinatus, porphyreus, nitens. *Valvae* 3, depressae.

Semen pyramidale vel elongatum, atro-brunneum vel nigrum, 1–2 x 1 mm, latere dorsali rotundato et reticulato, ventrali cum aliquot porcis ad hilum ascendentibus. *Ovulodia* breviora, flavida vel porphyrea.

Type: North Twin Peak Island, Recherche Archipelago, Western Australia (33°59'S, 122°51'E) 10 Feb. 1960, R. D. Royce 6264 (holo: PERTH; iso: FRI).

A mallee 1.5–8 m tall. *Stems* slender (mainland occurrence) or stout (island occurrence) with light-grey, yellowish-green or greenish-grey, smooth, glandular bark. Large specimens with 20 cm of basal red-brown fibrous bark and with branches conspicuously wrinkled at base on underside. Young branchlets quadrangular in cross section. Capable of forming lignotubers.

Cotyledons reniform 4–9 x 6–12 mm, triplinerved at the base, green above, purple below. *Intermediate leaves* green (island occurrence) or blue-green (mainland occurrence). *Seedling leaves* sessile, decussate, elliptical or oblong, denticulate, 1.5–7 x 0.5–3 cm, green, discolorous. *Adult leaves* small, erect, lanceolate, narrow-lanceolate or falcate, uncinata, 4.5–7.5 x 0.5–0.8 cm, green, concolorous. *Reticulations* sparse. *Oil glands* numerous, circular in outline, varying in size, many per areole. *Petioles* slender, flattened, channelled above, strongly glandular, 4–8 mm long.

Inflorescences axillary, multiflowered. *Peduncles* slender, 5–8 mm long, mostly recurved. Bracts 6. *Buds* clavate 4–6 x 2–3 mm. *Pedicels* 3–5 mm long. *Operculum* hemispherical, apiculate, shorter and slightly narrower than the hypanthium. Stamens all fertile. *Filaments* erect then radially inflected. *Anthers* oblong, dorsifixed, versatile, opening by nonconfluent slits, some of which are wholly longitudinal, others with the upper part oblique towards the gland which is terminal. *Style* tapering. *Stigma* inconspicuous. Locules 3. *Ovules* in 2 vertical rows.

Fruit pedicellate, ovoid, 7–8 x 5–6 mm, shallowly wrinkled. *Disc* oblique above then descending vertically, red-brown, shining. *Valves* 3 sunken.

Seed pyramidal or elongate, dark brown or black, 1–2 x 1 mm, rounded and finely pitted on the dorsal side, with ribs ascending to the hilum on the ventral side. *Chaff* smaller, yellow or red-brown.

Distribution: Western Australia, North Twin Peak Island, Mt Le Grand district.



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Figure 8—*Eucalyptus insularis* sp. nov. A—Ovules, x 25. B—Bud section, x 9. C—Buds, x 1.5. D—Leaves, x 1. E—Anthers, x 25. F—Seed and chaff, x 25. G—Fruit, x 1.5.

Other collections: about 1 mile northeast of beach just N of Mt Le Grand, Western Australia (33°58'S, 122°08'E) 9 Aug. 1971, *A. S. Weston* 6470 (PERTH); 5 Nov. 1971, *A. S. Weston* 7044 (PERTH, FRI); 15 Mar. 1972, *K. M. Allan* 827 (PERTH, FRI, NSW) and 22 April 1972, *M. I. H. Brooker* 3619 (FRI, PERTH, AD, K, HO); North Twin Peak Island, Recherche Archipelago, Western Australia (33°59'S, 122°51'E) 24 April 1972, *M. I. H. Brooker* 3637 (FRI, PERTH, K, NSW, GAUBA, AD, MEL, BRI).

Flowering period: unknown.

Until recently *E. insularis* was known only from North Twin Peak Island (the reason for the specific name) where it was found growing in gullies on the western side (R. D. Royce 6264). It has since been found at the base of a gneissic cliff about $\frac{3}{4}$ of the way up on the northern side of the island (M. I. H. Brooker 3637). There it is a stout mallee about 8 m tall growing obliquely in a dense thicket with and emergent above *Acacia heteroclita* Meisn. Nearby but non-associated species are *E. lehmannii* (Prciss ex Schau.) Benth. and *E. cornuta* Labill. It is likely to occur on other islands of the Recherche Archipelago which are large enough to support trees. No mainland occurrence was known until 1971 when it was found as a very small, isolated population near Cape Le Grand (*A. S. Weston* 6470, 7044, *K. M. Allan* 827, *M. I. H. Brooker* 3619) again at the base of a gneissic outcrop where it must be favourably situated for water. At this locality it is a mallee shrub to 2 m tall with narrower leaves than those of the island population. At Cape Le Grand it is associated with *E. lehmannii*. It is likely to be found in similar locations near the coast and east of Cape Le Grand.

Its natural affinities are obscure as it resembles closely no other eucalypt species. It could tentatively be placed alone in a sub-series of the series *Buprestinae*.*

***Eucalyptus brevistylis* M. I. H. Brooker sp. nov.** (Figures 9, 10) Pryor and Johnson code MAE:A.

Arbor usque 40 m alta. *Ramuli* tenues, quadrangulares in sectione transversali, interdum glauci. *Planta* omnino glabra. *Cortex* hepaticus fibrosus, longitudinaliter fissuratus. *Glandulae oleosae* in cortice. *Lignotuber* nullum visum.

Cotyledones reniformes, 6–9 x 10–12 mm, ad basin triplinerves, supra virides, infra purpureae. *Folia plantulae* petiolata, decussata, cordiformes, 2–6 x 1·5–4 cm, discoloria, supra viridia, infra pallidiora, per 3–4 nodos opposita, deinde ab intranodiis separata. *Petioles* 0·8–1·5 cm longi. *Surculi* caulibus glaucis et foliis petiolatis, ovatis, cordatis. *Folia adulta*, petiolata, in gemma decussata, demum ab intranodiis separata, lanceolata vel falcata, obliqua, tenuia, 7–10 x 1·5–3 cm, aliquot uncinata, discoloria, supra viridia, infra pallidiora, moderate dense reticulata, glandulis oleosis numerosis, circularibus, aliquot per areolam. *Petioles* graciles, 1–2 cm longi. *Vena* intramarginalis remota.

Inflorescentiae axillares, 11(13) florae. *Pedunculi* 8–15 mm longi. *Alabastra* clavata vel ovoida, 2–3 x 2–3 mm, pedicellis breviora (4–8 mm). *Operculum* hemisphaericum, laeve, hypanthium circa aequans. *Filamenta* longitudine variabilia, in alabastro radiale inflexa, aliquot sine antheris. *Antherae* reniformes, dorsifixae, versatiles, ab rimis obliquis confluentibus dehiscentes, glandula terminali. *Stylus* operculo multo brevior. *Stigma* inconspicuum. *Ovarium* 3-loculare. *Ovula* verticaliter 2-seriata.

Fructus pedicellatus, ovoideo-truncatus, 5–10 x 6–9 mm, vertice contractus, rugosus vel aliquantum costatus, ad marginem tenuis. *Discus* verticalis vel obliquus, porphyreus, nitens. *Valvae* 3, depressae, obscurae.

Semen pyramidale, 2 x 1 mm, brunneum, laterc dorsali rotundato et foveato, ventrali cum porcis aliquot ad hilum adscendentibus. *Ovulodia* breviora, flavida.

Type: About 14 miles northeast of Walpole, Western Australia (34°49'S, 116°53'E) 15 Feb. 1971, *B. R. Maslin* 1694 (holo: PERTH; iso: FRI, NSW, K, AD, MEL, BRI, HO).

A large tree to 40 m tall. *Branchlets* slender, quadrangular in cross-section, sometimes glaucous. Plant wholly glabrous. *Bark* yellow-brown fibrous, longitudinally fissured. *Oil glands* present in bark. *Lignotuber* not seen.

* Unless otherwise indicated, subgenera, series and subseries refer to Pryor and Johnson (1971).



Figure 9—*Eucalyptus brevistylis* sp. nov. A—Ovules, x 30. B—Bud section, x 9. C—Buds, x 2. D—Leaves, x 1. E—Anthers, x 45. F—Seed and chaff, x 10. G—Fruit, x 1.5.

Cotyledons reniform, 6–9 x 10–12 mm, triplinerved at the base, green above, purple below. *Seedling leaves* petiolate, decussate, cordiform, 2–6 x 1·5–4 cm, discolorous, green above, paler below, becoming separated by intranodes after 3–4 nodes. *Petioles* 0·8–1·5 cm long. *Epicormic shoots* with axis glaucous and leaves petiolate, ovate, cordate. *Adult leaves* petiolate, decussate in bud, separated by intranodes on the mature axis, lanceolate or falcate, oblique, thin 7–10 x 1·5–3 cm, sometimes uncinat, discolorous, green above, paler below, moderately densely reticulate, oil glands numerous, circular, several per areole. *Petioles* slender, 1–2 cm long. Intramarginal vein remote.

Inflorescences axillary, of 11 (13) buds. *Peduncles* 8–15 mm long. *Buds* clavate or ovoid, 2–3 x 2–3 mm, shorter than the pedicels (4–8 mm). *Operculum* hemispherical, smooth, about equal to the hypanthium. *Filaments* variable in length, inflected radially in bud, some without anthers. *Anthers* reniform, dorsifixed, versatile, opening in oblique confluent slits, gland terminal. *Style* much shorter than operculum, stigma inconspicuous. *Locules* 3. *Ovules* in 2 vertical rows.

Fruit pedicellate, ovoid-truncate, 5–10 x 6–9 mm, contracted at the top, wrinkled or sometimes shallowly ribbed. Rim thin. *Disc* vertical or oblique, red-brown, shining. *Valves* 3, sunken, obscure.

Seed pyramidal, 2 x 1 mm, brown, rounded and finely pitted on the dorsal side with several ribs ascending to the hilum on the ventral side. *Chaff* smaller yellow.

Distribution: Western Australia, Walpole Forest Division.

Other collections: Soho Block, Ref. JO 113 79, Western Australia, May 1970, B. J. White (PERTH, FRI); about 14 miles northeast of Walpole, Western Australia (34°49'S, 116°53'E)

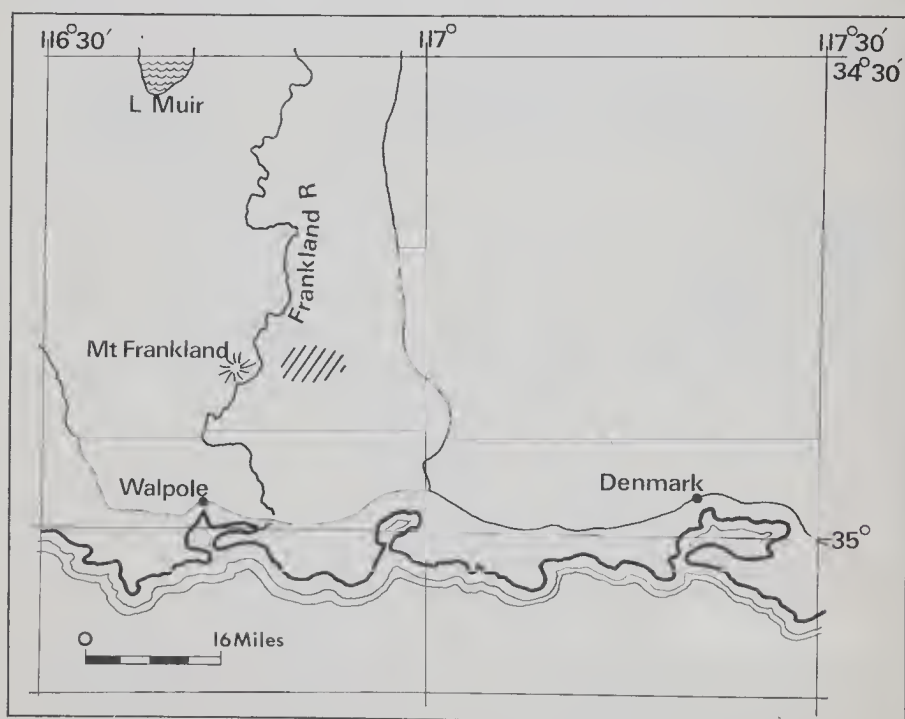


Figure 10—Distribution of *Eucalyptus brevistylis* sp. nov. (shaded area).

15 Feb. 1971, *B. R. Maslin* 1693 (PERTH, FRI, NSW, GAUBA, AD, MEL) and 19 April 1972, *M. I. H. Brooker* 3576 (FRI, PERTH, NSW, AD, MEL, BRI, GAUBA).

Flowering period: February–May.

A tribute must be made to the late Forester J. Rate through whose collections and persistent efforts from the early 1950's these trees have been recognised as a distinct species.

Eucalyptus brevistylis occurs in a small area of the Soho and London Blocks of the forest northeast of Walpole. The habitat is the banks and adjacent area of a creek deeply dissected for the locality (*B. J. White* pers. comm.). The soil is a yellow podsol. Nearby species are *E. marginata* Donn ex Sm. *E. calophylla* R. Br. ex Lindl. and *E. megacarpa* F. Muell.

White (1971) reports that the external appearance of the trees is that of *E. jacksonii* Maiden (red tingle) although the wood is similar to *E. guilfoylei* Maiden (yellow tingle). However, the natural affinity of *E. brevistylis* is with subgenus *Monocalyptus*. It shares relatively flexible characters like habit, bark, and fruit shape with *E. jacksonii* but these resemblances must be regarded as superficial as the differences are numerous and sometimes critical. They include the discoloured adult leaves, the short operculum, the regular inflection of the filaments some of which are anantherous, the small style (the reason for the specific name), the rugose fruit, the yellow wood, and the petiolate, cordiform seedling leaves.

Eucalyptus brevistylis appears then to be somewhat taxonomically isolated and a possible relict species. Some of the critical features it shares with other groups in *Monocalyptus*. Regularly inflected filaments occur as well in the sub-series Buprestinae (including *E. insularis* M. I. H. Brooker sp. nov.), Considenianinae and Haemastominae and in *E. andrewsii* Maiden and *E. campanulata* R. T. Bak. et H. C. Sm.; anantherous filaments in the Considenianinae and Haemastominae; small styles in the Considenianinae, Haemastominae (clearly shown for *E. haemastoma* Sm. by Mueller (1879)), *E. andrewsii* and *E. campanulata* and to a lesser extent in the Amygdalininae. Inflected filaments occur as well in the two anomalous species *E. cloeziana* F. Muell. (Section Macrantherae, Blakely 1934; subgenus *Idiogenes*, Pryor and Johnson 1971) and in *E. microcorys* F. Muell. (Section Renantherae, Blakely 1934; subgenus *Symphomyrtus*, Pryor and Johnson 1971). *E. microcorys* also has some anantherous filaments.

A further character common to these groups (except the Amygdalininae) is the presence in many buds of tubular tissue descending from the underside of the operculum and which in some buds completely ensheathes the style. Carr and Carr (1968) identified this tissue in some species of *Eudesmia* and *Monocalyptus* as petaline downgrowths. It occurs also in *E. cloeziana* and *E. microcorys*. From an incomplete survey the character appears to be common in mature buds of *Monocalyptus* species whose opercula are hemispherical or depressed-hemispherical and whose filaments are inflected. Carr and Carr (loc. cit.) cite species in *Monocalyptus* other than those discussed above in which the condition, although present in early stages, is obliterated during the expansion of growth undergone during the maturation of the bud.

Evidence of fairly inflexible characters is therefore provided to suggest links in affinity between some *Monocalyptus* in both eastern and western Australia. The unique feature of *E. brevistylis* is the juvenile leaves. Markedly petiolate, cordiform seedling leaves do not occur elsewhere in *Monocalyptus* and they resemble the seedling leaves of some species in the quite unrelated subgenus *Corymbia*, and to some extent the intermediate or coppice leaves of *E. obliqua* L'Hérit. and *E. camfieldii* Maiden, but again these are only superficial likenesses.

Acknowledgements

I would like to thank Mr K. Allan for the illustrations of *E. aquilina*, *E. calcicola* and *E. ligulata*; Mr G. Moss for the illustrations of *E. insularis*, *E. brevistylis* and *E. exilis*; Mr G. Moss and Mr R. Aronsen for the maps; Mr A. S. George for his critical examination and checking of the manuscript; Mr D. Kleinig for his assistance in checking the manuscript; Mr B. J. White, Mr A. S. George, Mr B. Rockel and Mr K. Allan for their assistance in the field; Mr Harry Butler for bringing *E. calcicola* to my attention; and Mr D. McKenzie for his patient navigation from Esperance to North Twin Peak Island.

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Studies in the genus *Acacia*—2* —Miscellaneous new phyllodinous species—

By B. R. Maslin

Abstract

Six new species of *Acacia* are described: *A. amplexiceps* sp. nov., *A. aphylla* sp. nov., *A. ashbyae* sp. nov., *A. microcalyx* sp. nov., *A. pachypoda* sp. nov., and *A. redolens* sp. nov. These species belong to Bentham's division Phyllodineae, and, except for *A. amplexiceps*, all are endemic to Western Australia.

Introduction

The term "pulvinus", which appears below, is a useful taxonomic character but has rarely been used in *Acacia* descriptions in the past. One definition of this term given by Jackson (1928) is "the swollen base of the petiole, as in *Mimosa pudica* Linn.". This term is normally used with reference to the compound leaves of Caesalpinioidae, Mimosoideae, and certain genera of Papilionoideae. As the phyllodes of *Acacia* species are modified compound leaves, this term may also be applied to them, as Boke (1940) has done. As used by the present author, the term "pulvinus" refers to the yellow, often rugose, structure situated at the base of the phyllodes in most species of *Acacia*; it is normally separated from the branch by a constriction. Boke (l.c.) states that the many vascular bundles of the phyllode "lamina" converge to a single trough-shaped bundle in the pulvinus; the anatomy of the pulvinus is similar to that of an ordinary leaf petiole, its epidermis is heavily cutinized, and the cells between the epidermis and the vascular tissue are typical parenchyma cells, displaying a small number of chloroplasts.

Unless otherwise indicated, the specimens cited in this paper are housed at the Western Australian Herbarium (PERTH).

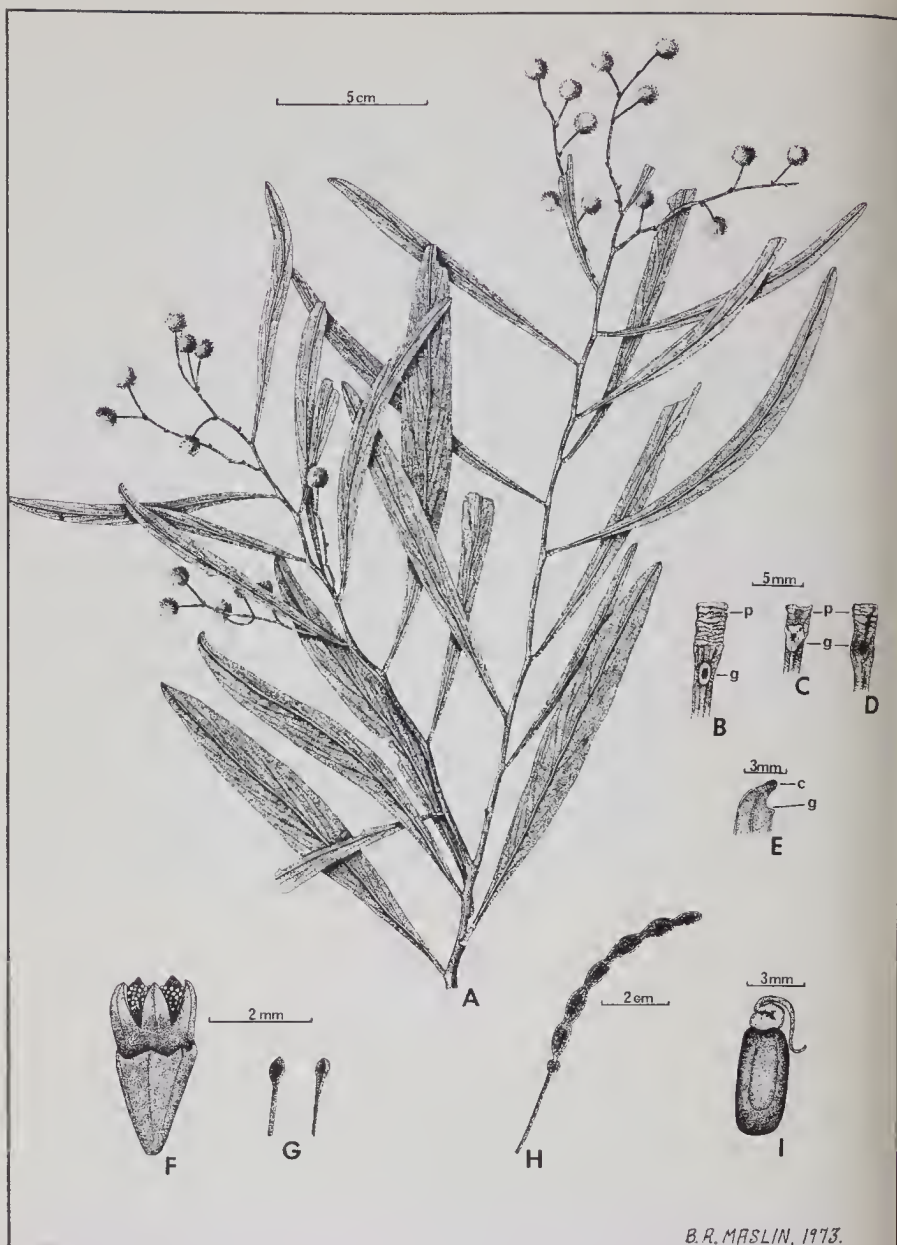
1. *Acacia amplexiceps* B. R. Maslin sp. nov. (Figures 1, 2, and 4A).

Frutex grandis dumalis vel arbor parva ramosa plerumque 2–7 m alta; *ramuli* glabri. *Phyllodia* variabilia plerumque linearia ad lanceolata, 70–250 x 7–30 mm, glabra, pallide viridia, costis prominentibus. *Glans* in margine supero phyllodii ad vel prope extremum distale pulvini, glans minor plerumque sub callo apicali. *Inflorescentia* plerumque racemosa, glabra; *pedunculis* 2–11 per racemo. *Capitula* alba ad luteola, 25–50 floribus. *Flos* 5-merus, glaber; *calyx* sinuato-dentatus; *petala* 3–3.5 mm longa. *Legumen* durum, fragile, glabrum. *Semina* longitudinalia, oblonga, fusca; *funiculus* arillusque flammei.

Type: 19 km N of Sandfire roadhouse (between Broome and Port Hedland), on Great Northern Highway, Western Australia, 9 June 1972, B. R. Maslin 2702 (holo: PERTH; iso: BRI, CANB, K, NSW, NY).

Large bushy *shrub* or small shrubby *tree* 2–7 m tall; *trunk* to 0.3 m diam. at ground level, with smooth grey bark; *branches* often pendulous; *branchlets* sometimes flexuose, insignificantly ribbed, smooth, glabrous, yellowish. *Stipules* caducous, broadly triangular, ca. 1.5 mm long, brown. *Phyllodes* variable, normally linear to lanceolate, sometimes narrowly obovate, 70–250 x 7–30 mm, straight to slightly falcate, spreading to pendulous, glabrous, light

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B. R. MASLIN, 1973.

Figure 1—*Acacia ampliceps* sp. nov. A—Portion of branch system (note phyllode deterioration due to insect action). B to D—Base of phyllodes showing pulvinus (p) and gland (g) variability. C—gland lip laterally flattened. D—gland recessed. E—Apex of phyllode showing callus (c) and gland (g). F—Flower. G—Bracteoles. H—Legume. I—Seed. A from R. D. Royce 1962; B from B. R. Maslin 2736; C, F from B. R. Maslin 2676; D, E from B. R. Maslin 2702; G from R. D. Royce 7402; H from M. I. H. Brooker 2059; I from McInnes 2.

green, midrib prominent and yellowish, marginal nerve similar but less prominent, lateral veins openly reticulate, apical callus straight or uncinate; pulvinus 2–5 mm long, prominently transversely rugose. Gland situated on upper margin of phyllode at (or near) distal end of pulvinus, a smaller gland normally occurs below the apical callus, circular or oblong, 1–2 (2·5) mm diam.,

lip not prominent (sometimes laterally flattened), sometimes recessed. *In-florescences* normally racemose (sometimes a few inflorescences reduced to solitary flower heads), axillary or terminal, often paniculate when terminal due to phyllode reduction, axis glabrous and up to 100 mm long with two small caducous bracts at the base; *peduncles* 2–11 per raceme, 5–15 mm long (to 25 mm in fruit), longitudinally sulcate, glabrous, subtending bract solitary and caducous. *Flower heads* white to cream, globular, 7–10 mm diam. at anthesis, with 25–50 $\pm$ densely packed flowers. *Bracteoles* 1.5 mm long, glabrous, spatulate; laminae slightly concave. *Flowers* 5-merous; *calyx* 1/2 (or slightly more) length of corolla, sinuate-toothed, translucent, glabrous, obscurely 5-nerved to nerveless; *petals* 3–3.5 mm long, connate for 3/4 their length, glabrous, obscurely 1-nerved; *ovary* glabrous. *Legumes* 70–95 x ca. 5 mm, hard, $\pm$ brittle, somewhat contracted between seeds, surface undulate, glabrous, light greyish brown; margins hardly thickened, yellow. *Seeds* longitudinal, oblong, 5–6.5 x ca. 3 mm, greyish brown, $\pm$ shiny; *pleurogram* open towards the hilum; *funicle* scarlet, slightly dilated, reflexed below a once or twice folded scarlet aril (orange before maturity).

Distribution and habitat: Western Australia and Northern Territory; in Western Australia from the vicinity of Carnarvon northwards to Derby, then extending eastwards through the southern Kimberley region to Renner Springs in the Northern Territory. *Acacia amplexes* has been recorded from two islands in the Dampier Archipelago (Enderby and Lewis Islands) and as far inland as the Rudall River (near Lake Disappointment) in Western Australia. This species typically grows along creeks and rivers where it often forms dense



Figure 2—Distribution of *Acacia amplexes*.

communities. These watercourses have either sandy or clayey beds and sometimes *Arthrocnemum* species grow in association. In some places along the Eighty Mile Beach *A. amplexiceps* forms small thickets in hollows between the coastal sandhills (see Burbidge, 1944—there referred to as *A. salicina*).

WESTERN AUSTRALIA: Carnarvon, *G. B. Barnett* s.n.; Albert Edward Range, *J. S. Beard* 5636; Millstream, *M. I. H. Brooker* 2059 (dups. MEL, NSW); Nalgi Station, 80-mile Beach, *N. T. Burbidge* 1287 and 1351; Base of Mount Brennan, *W. V. Fitzgerald* 1191; Fitzroy Crossing, *Mrs. Guppy* 4; 111 km E Broome towards Derby, *B. R. Maslin* 2676 (dups. AD, B, L, NT); Chinnamon Creek on Port Hedland-Wittenoom road, *B. R. Maslin* 2713; Fortescue River crossing, E of Millstream, *B. R. Maslin* 2736; Globe Hill, Ashburton River, *A. Morrison* s.n. (NSW 107162); 41 mi S of Nicholson Station, *R. A. Perry* and *M. Lazarides* 2438 (NSW, PERTH); Rudall River, *M. McInnes* 2 and 7; South Barlee Range, *A. Robinson* s.n., Sept. 1959; Bamboo Springs Station, *R. D. Royce* 1962; West Lewis Island, Dampier Archipelago, *R. D. Royce* 7402; Enderby Island, Dampier Archipelago, *R. D. Royce* 7478; Woodstock, 60 miles SW Marble Bar, *H. Suijendorp* 119.

NORTHERN TERRITORY: South of Powells Creek, *C. E. F. Allen* s.n. (NSW 107160); near Mataranka homestead, *R. Coveny* 516 (NSW); Tanami, *Jensen* s.n. (NSW 107158); Renners Springs homestead, *J. R. Maconochie* 639 (NT); Roper River, *W. Baldwin Spencer* s.n. (NSW 107157); North of MacDonnell Ranges, *P. A. White* s.n. (NSW 107159).

Flowering and fruiting period: Flowers from May to August; mature legumes are present from late August to November.

According to Bentham's classification (1864) *A. amplexiceps* is placed in the Uninerves-Racemosae.

Previously this species was known as either *A. salicina* Lindl. or *A. varians* Benth. However, *A. varians* is a taxonomic synonym of *A. salicina* (see Black, 1920). Bentham applied the name *A. salicina* to *A. ligulata* Cunn. ex Benth. then subsequently described the true *A. salicina* as *A. varians*. Mr L. Pedley, while Australian Liaison Officer at Kew in 1971, supported the above conclusion after consulting the type of *A. varians*. Having inspected the type collection of *A. varians* and having seen a photograph of the type of *A. salicina*, the present author confirms both Black and Pedley's contention that *A. varians* is a taxonomic synonym of *A. salicina*. Having conducted extensive field work in Queensland, Pedley noted that *A. salicina* exhibits considerable phyllode variation; on a single tree the phyllodes can range from extremely broad and somewhat undulate (*A. varians*) to rather narrow (*A. salicina*). The type of *A. salicina* is from the Laehlan River (near Forbes, NSW) while the type of *A. varians* is from the Balonne River (near St. George, SE Queensland). *Acacia amplexiceps* occurs in Western Australia and Northern Territory, but does not extend into New South Wales or Queensland.

The glabrous racemes, the sinuate-toothed calyx, the hard-valved legumes, the longitudinal seeds with their scarlet funicles and arils, and the presence of a sub-apical as well as a basal gland on most of the phyllodes, relate *A. amplexiceps* to *A. ligulata* and *A. salicina*. From both of these species *A. amplexiceps* is distinguished by its larger flower heads, its narrower legumes, and its less prominent funicle and aril. Furthermore, *A. amplexiceps* is distinguished from *A. ligulata* by its cream-coloured flower heads and its broader, longer, and more thinly textured phyllodes. From *A. salicina*, *A. amplexiceps* is again distinguished by its phyllodes drying to a light green colour (grey-green in *A. salicina*) and having a more prominent midrib, its normally longer and more prominently rugose pulvinus, and its grey-brown, oblong seeds.

The growth habit, large and often pendulous phyllodes, glabrous racemes, and large flower heads, render *A. amplexiceps* superficially similar to *A. saligna* (Labill.) H. Wendl. (a south-west Western Australian species). However, the flowers and legumes of these two species are quite different.

The phyllodes of the new species seem to be particularly susceptible to insect attack (see Figure 1A).

The specific epithet alludes to the large flower heads which are typical of *A. amplexiceps*.

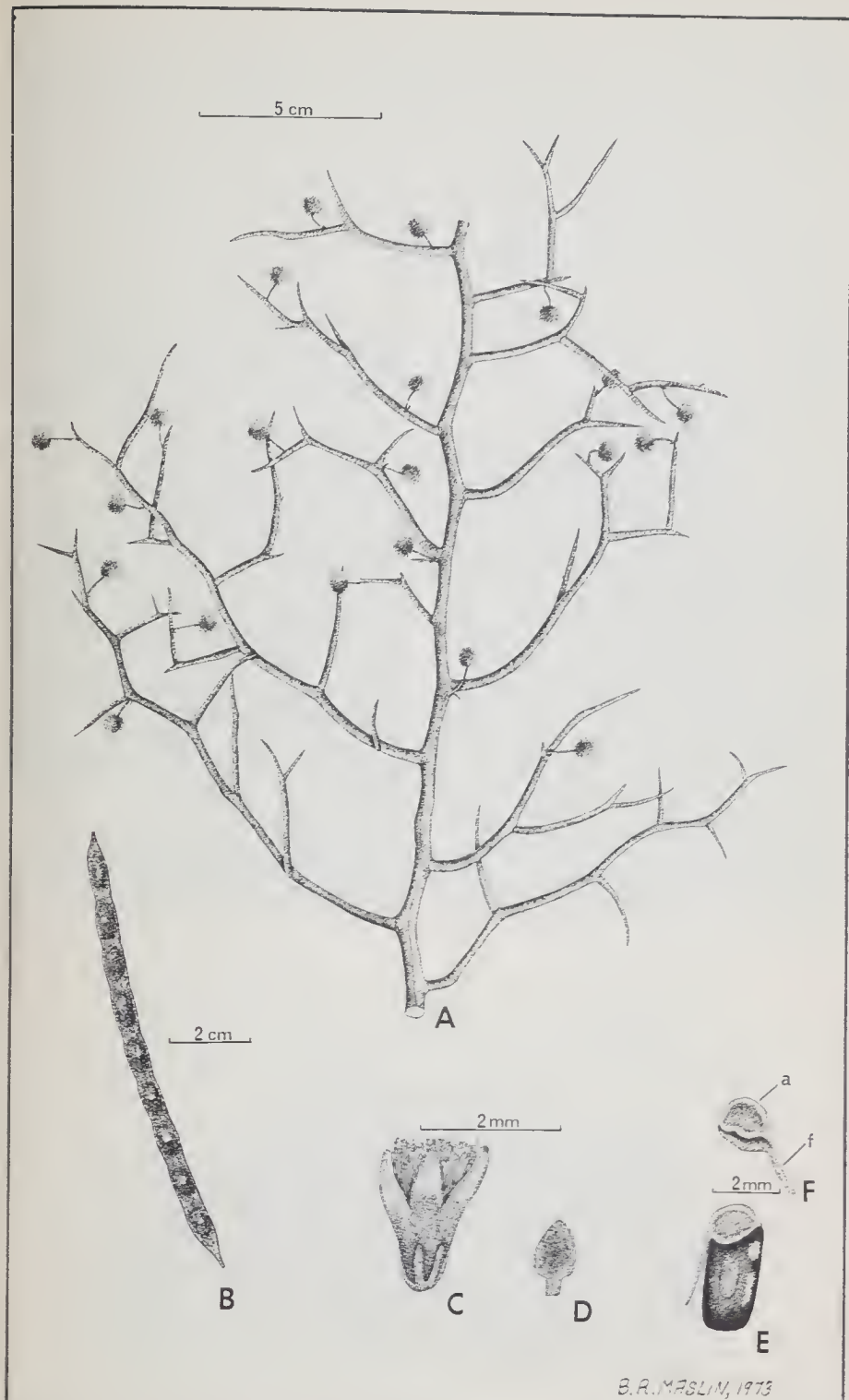


Figure 3—*Acacia aphylla* sp. nov. A—Portion of branch system. B—Legume. C—Flower. D—Bracteole. E—Seed. F—Funicle (f) and aril (a).
A, C, D from B. R. Maslin 669a; B, E, F from R. Wilkie s.n.

2. *Acacia aphylla* B. R. Maslin sp. nov. (Figures 3, 4B, and 9).

Frutex divaricate-ramosus ad 2 m altus; *rami* spinescentes glabri glauci. *Phyllodia* ad squamas caducas redacta. *Pedunculi* solitarii, ad basin sub anthesi ebracteati. *Capitula* globosa, 26–29 floribus. *Flos* 5-merus (petalis interdum 4); *sepala* ad basin breviter connata, anguste-oblonga; *petala* 2 mm longa. *Legumen* 30–90 x 3–4 mm, glabrum. *Semina* longitudinalia, oblonga, 4–4.5 x 2–2.5 mm, nigra.

Type: About 2 mi downstream from Mundaring Weir (Helena River valley), Western Australia? 4 Aug. 1970, B. R. Maslin 669a. (holo: PERTH; is: B, CANB, K, MEL, NSW, NY).

Divaricately branched *shrub* to 2 m tall; *branches* terete, spinescent, finely and sparsely nerved, smooth or finely wrinkled (especially on branchlets), glabrous, conspicuously glaucous. *Phyllodes* reduced to caducous scales.

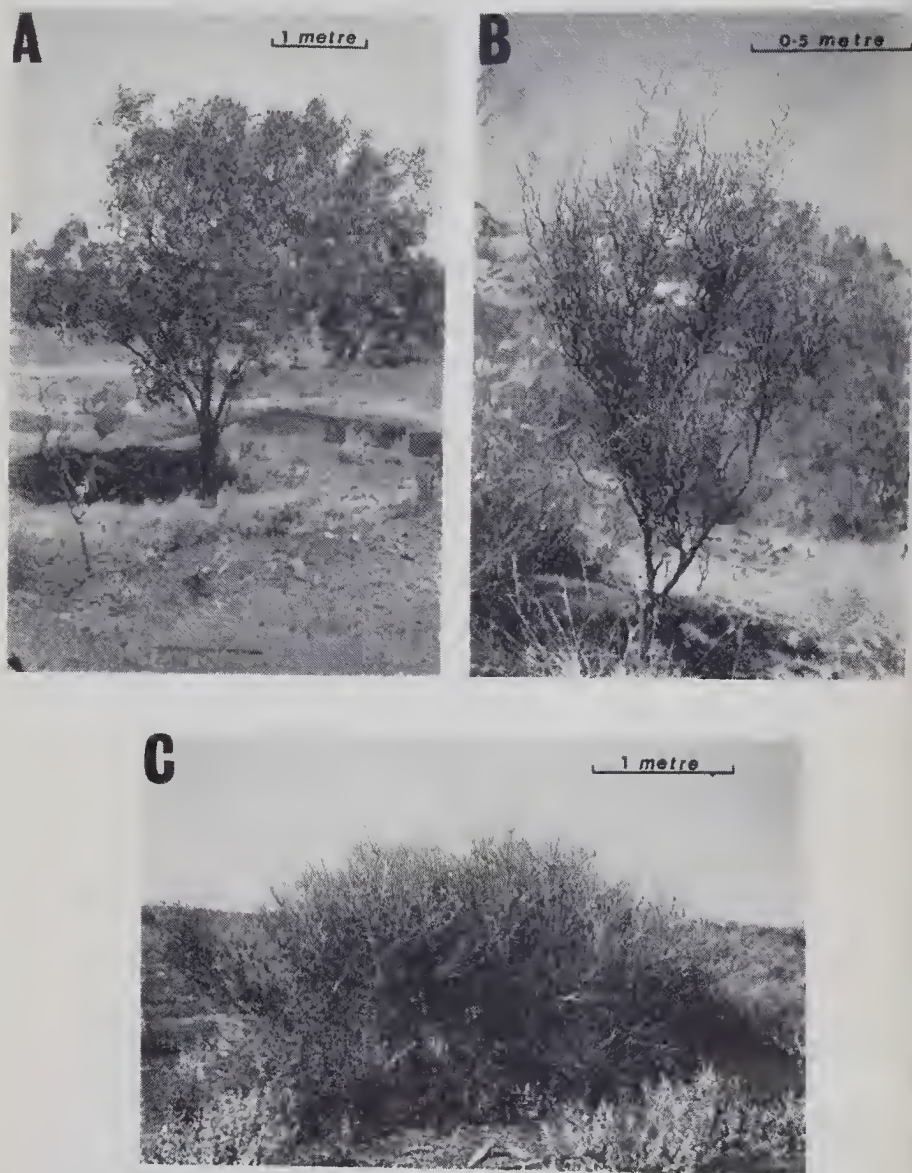


Figure 4—A—*Acacia amplexa* sp. nov. B—*Acacia aphylla* sp. nov. C—*Acacia microcalyx* sp. nov.

Peduncles solitary, ca. 10 mm long, glabrous, base ebracteate at anthesis. *Flower heads* yellow, globular, 6–7 mm diam. at anthesis, with 26–29 $\pm$ densely packed flowers. *Bracteoles* 1 mm long; claws very short; laminae broad, $\pm$ ovate, slightly concave, ciliate, sparsely puberulous abaxially. *Flowers* 5-merous (petals sometimes 4); *sepals* 1/4–1/3 length of petals, shortly united at the base, narrowly oblong, ciliate; *petals* 2 mm long, connate for 1/3 to 1/2 their length, glabrous, nerveless or obscurely 1-nerved; *ovary* glabrous. *Legumes* 30–90 x 3–4 mm, slightly contracted between the seeds, surface undulate, finely reticulate, glabrous, slightly pruinose, purplish grey; marginal nerve obscure (more prominent on young legumes). *Seeds* longitudinal, oblong, 4–4.5 x 2–2.5 mm, black, somewhat shiny: *pleurogram* open towards the hilum; *areole* ca. 1.5 x 0.5 mm; *funicle* straight and linear, abruptly expanded into a cream-coloured pileiform aril which has narrow fleshy projections on either side and on the back.

Distribution and habitat: South-west Western Australia; this species has been recorded from only two localities, viz. the Helena River valley about 3.4 km downstream from Mundaring Weir, and from Spencers Brook (which is south of Northam). In both of these areas *A. aphylla* occurred in hilly country, growing among granite outcrops.

WESTERN AUSTRALIA: Hidden Valley, *H. Demarz* 2368; Helena River, 2 mi (3.4 km) downstream from Mundaring Weir, W.A., 31°57'S and 116°08'E, *A. S. George* 6773; Spencers Brook, *R. D. Royce* 8237; Near Mundaring Weir, Darling Range, *R. Wilkie* s.n., 12 March 1972.

Flowering and fruiting period: Flowers from August to October; young legumes appear in October, while mature legumes have been collected in December and March.

The divaricate, spinescent, glaucous branches, which are completely devoid of normal phyllodes (reduced to caducous scales), make *A. aphylla* a very distinctive species in the genus *Acacia*.

The inflorescence characters of this new species are similar to those of *A. exocarpoides* W. V. Fitz. (which may also appear leafless due to the phyllodes being shed upon collection). However, these two taxa differ in many other respects, e.g. branching pattern, legume and seed morphology.

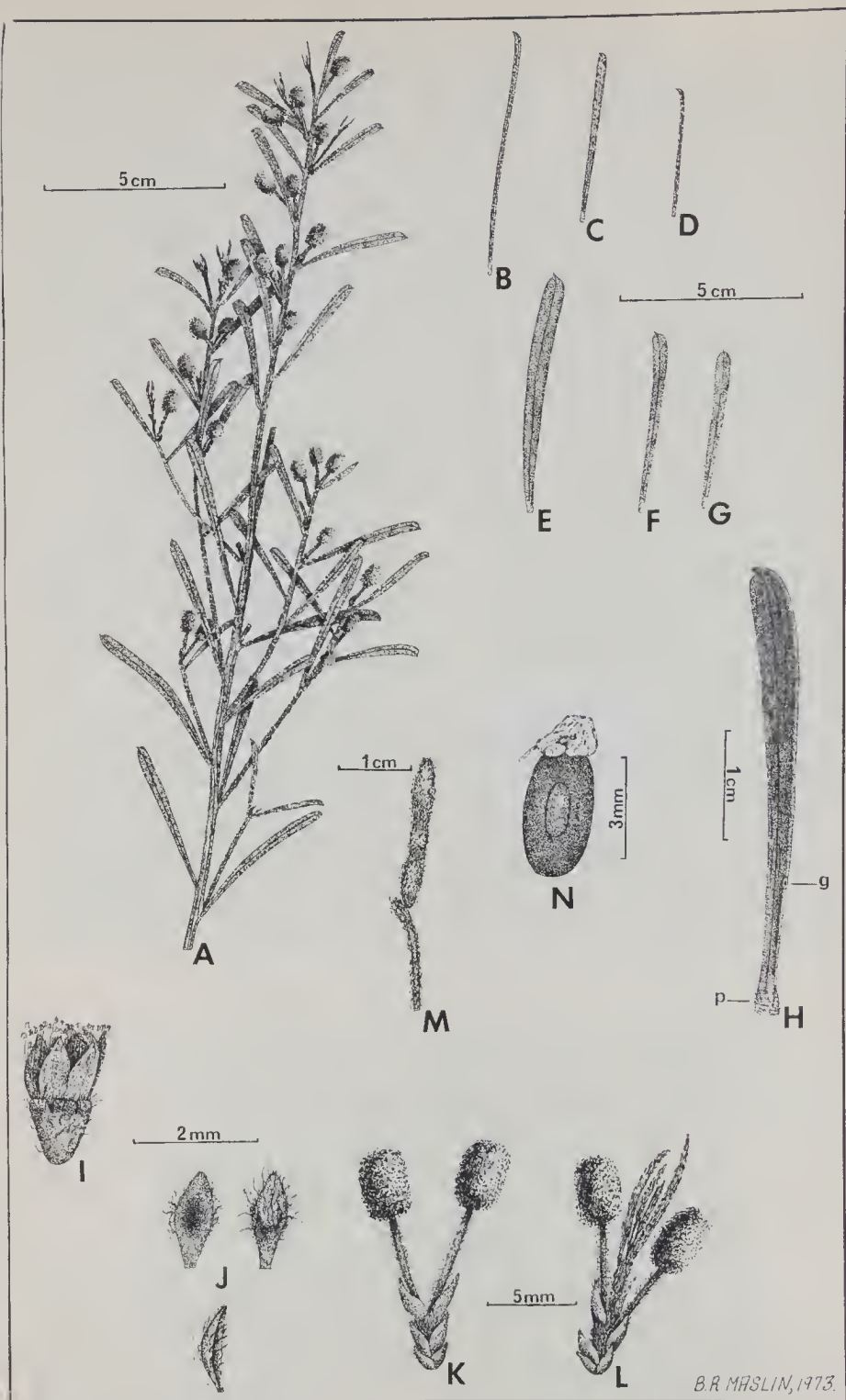
The specific epithet alludes to the absence of normal phyllodes, which is a characteristic feature of this species.

3. *Acacia ashbyae* B. R. Maslin sp. nov. (Figures 5 and 9).

Frutex densus rotundatus 1.5–2 m altus surculis dense tomentosis eburneo-luteolis; *ramuli* dense tomentosi. *Phyllodia* variabilia, linearia ad anguste obovata, 30–90 x 1–3 mm, plana ad teretia, parce tomentosa, flavovirentia, nervis mediis marginalibusque tenuibus. *Glans* in margine supero phyllodii, 10–20 mm supra pulvinum. *Inflorescentia* racemus brevis axillaris ab bracteis 4 brunneis subtentus; axis racemi surculum saepe faciens. *Capitula* ovoidea, *Flos* 5-merus; *calyx* breviter obtuse-lobatus; *petala* 2 mm longa. *Legumen* ca. 35 x 3 mm. dense tomentosum. *Semina* longitudinalia, oblonga, 3.5–4 x 2–2.5 mm.

Type: Naraling, Western Australia, 27 Aug. 1972, *A. M. Ashby* 4584 (holo: PERTH; iso: AD, CANB, K, NY).

Dense, spreading, rounded *shrub* 1.5–2 m tall and ca. 2 m diam.; *new shoots* densely tomentose (hairs white to creamy white); *bark* smooth, grey; *branches* terete, finely ribbed, densely tomentose (hairs $\pm$ matted or appressed). *Stipules* caducous. *Phyllodes* variable, linear to narrowly obovate, 30–90 x 1–3 mm, flat (but slightly thickened) to $\pm$ terete, moderately tomentose (hairs confined to pulvinar region on older phyllodes), yellowish green, faintly wrinkled, central and marginal nerves fine (normally recessed upon drying), upper margin medially sulcate at the dilated base (more prominent in broad phyllodes), apex obtuse and obliquely mucronate; *pulvinus* 1–1.5 mm long,



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Figure 5—*Acacia ashbyae* sp. nov. A—Portion of branch system. B to G—Phyllode variation. H—Phyllode showing pulvinus (p) and gland (g). I—Flower. J—Bracteoles. K—Inflorescence. L—Inflorescence showing shoot developing at apex of raceme axis. M—Legume. N—Seed.

A, H-J from A. M. Ashby 2909; B from Chambers 91; C from Burns 22; D from Queensland Forestry Department; E, K from A. M. Ashby 1593; F from A. M. Ashby 4590; G from A. M. Ashby 2279; L, M, N from A. M. Ashby 4585.

transversely rugose. *Gland* situated on upper margin of phyllode 10–20 mm above the pulvinus, rarely with a second gland below the apical mucrone, circular to oblong, 0.5–0.6 mm diam., lip not prominent. *Inflorescence* a short axillary raceme which is subtended by ca. 4 $\pm$ persistent, brown, scarious, ciliolate bracts (basipetally decreasing in size), the larger of which are finely 6–8 nerved; *raceme axis* 1–3 mm long, densely white tomentose, often growing out as a new shoot at the apex; *peduncles* 1–2 per raceme, 7–11 mm long, densely white tomentose, subtending bract solitary. *Flower heads* ovoid, 6–10 x 5–7 mm at anthesis. *Bracteoles* ca. 2 mm long, protruding from between adjacent flowers in the bud; claws short; laminae $\pm$ concave, acuminate, sparsely to moderately tomentose abaxially. *Flowers* 5-merous: calyx 1/2 (or slightly more) length of corolla, divided from 1/6–1/4 its length into obtuse puberulous lobes, tube nerveless and glabrescent; *petals* 2 mm long, connate for ca. 1/2 their length, obscurely 1-nerved, glabrous or sparsely puberulous; *ovary* sessile, sparsely papillate. *Legumes* narrowly oblong, ca. 35 x 3 mm, $\pm$ brittle, slightly contracted between seeds, surface undulate, densely tomentose, greyish brown; margins hardly thickened, yellow. *Seeds* longitudinal, oblong, 3.5–4 x 2–2.5 mm, greyish brown, dull; *pleurogram* continuous or open towards the hilum; *areole* ca. 1.5 x 0.5 mm; *funicle* filiform, abruptly expanded into a thickened, once folded, wrinkled, yellowish aril which is narrowed at the hilum.

Distribution and habitat: Western Australia; chiefly occurring in the region between Ogilvie (which is 24 km north of Northampton) and Mullewa, but has been recorded from as far south as Coorow. *Acacia ashbyae* is not common throughout its range although in some places where disturbance has occurred (e.g. road verges) it does regenerate prolifically.

WESTERN AUSTRALIA: Rock Well, *A. M. Ashby* 1593 (dup. AD) and 2279; Between Naraling and Rock Well, *A. M. Ashby* 2909 (dup. AD); Naraling, *A. M. Ashby* 4585 and 4590 (dups. AD, BRI, MEL, NSW); East of Ogilvie, *A. C. Burns* 22; Coorow, *S. Chambers* 91; 10 mi north of Mullewa, *J. Goodwin* 142 (UWA); Cultivated at Dalby, Queensland, Forestry Department.

Flowering and fruiting period: Flowers from July to September; mature legumes present in November.

Although *A. ashbyae* appears to occur in the Uninerves-Racemosae (Bentham, 1864), the ovoid flower heads and sometimes $\pm$ terete phyllodes are unusual for this group. In addition, the racemes are somewhat atypical in that they are modified to 1–2 pedunculate flower heads borne on a short axis, the distal end of which often develops into a new shoot (see Figure 5L).

The densely tomentose peduncles and new shoots (hairs white to cream), the modified racemes, the brown scarious $\pm$ persistent inflorescence bracts, the ovoid flower heads, and the obliquely mucronate phyllodes, give *A. ashbyae* a distinctive appearance.

This species is named in honour of Miss A. M. Ashby, who, for many years has made valuable collections of the Western Australian flora.

4. *Acacia microcalyx* B. R. Maslin sp. nov. (Figures 4C, 6, and 9).

Frutex densus ramosissimus rotundatus 1.5–3 m altus; *ramuli* spinescentes glabri. *Phyllodia* linearia, 20–50 x 1–3 mm, glabra, obscure nervosa. *Glans* in margine supero phyllodii, 2–10 mm supra pulvinum. *Inflorescentia* plerumque racemus brevis axillaris. *Capitula* globosa, luteola. *Bracteolae* minutae. *Flos* 5-merus, glaber; *calyx* truncata, enervis; *petala* 2–2.5 mm longa, $\pm$ enervia. *Legumen* $\pm$ moniliformis, solide chartaceum, glabrum. *Semina* longitudinalia, globosa ad elliptica.

Type: 28 mi W of Overlander, on Shark Bay road, Western Australia, 19 Feb. 1962, *A. S. George* 3241 (holo: PERTH; iso: K).

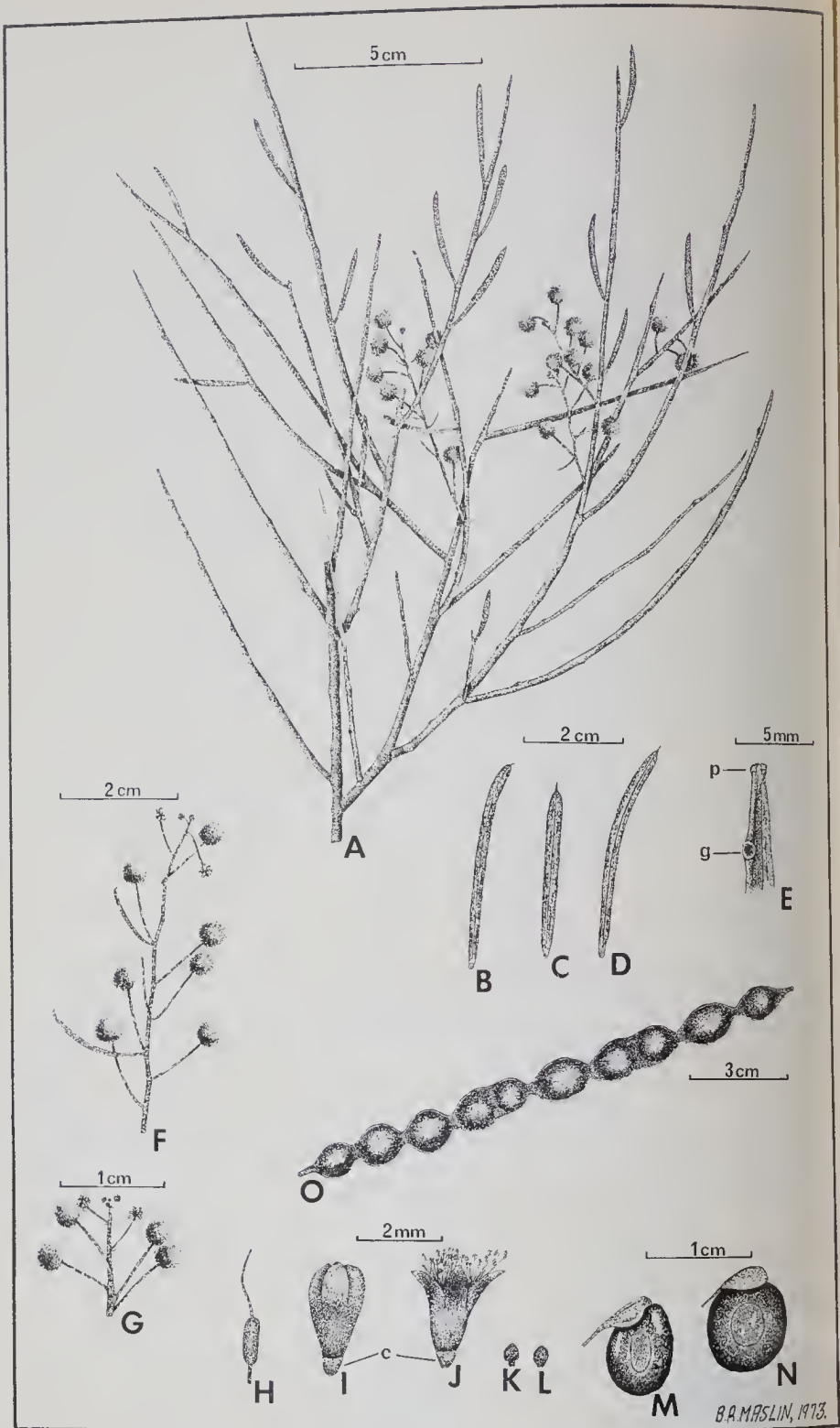


Figure 6—*Acacia microcalyx* sp. nov. A—Portion of branch system. B to D—Phyllode variation. E—Base of phyllode showing pulvinus (p) and gland (g). F—Short lateral branch with terminal raceme. G—Axillary raceme with abortive terminal flower heads. H—Stipitate ovary. I, J—Flower showing reduced calyx (c). K, L—Bracteoles. M, N—Seeds. O—Legume. A, D, E, G-K, N from A. S. George 3241; B, C, M, O from B. R. Maslin 2774; F from S. M. G. Carr 409; L from E. M. Strymeour 300.

Dense, profusely branched, $\pm$ rounded *shrub* 1.5–3 m tall; *bark* smooth, light grey on main branches, grey-green on branchlets (ashy grey after immersion in alcohol); *branchlets* straight, $\pm$ spinescent, terete, finely striate (striae 0.5–1 mm apart), glabrous. *Stipules* caducous. *Phyllodes* readily shed upon collection, linear, 20–50 x 1–3 mm, straight or curved, patent to ascending, flat, glabrous, light grey-green (ashy grey after immersion in alcohol), midrib and lateral veins obscure, faintly wrinkled; *apiculus* short, straight or uncinate, brown; *pulvinus* short, slightly dilated. *Gland* situated on upper margin of phyllode 2–10 mm above the pulvinus, circular to oblong, lip not prominent, orifice brown. *Inflorescence* a short axillary (rarely terminal) raceme, sometimes reduced to solitary flower heads borne on short lateral branches (these branches may appear racemose due to phyllode reduction); *raceme axis* 7–14(20) mm long, glabrous, apex $\pm$ narrowed and bearing 1–3 abortive flower heads; *peduncles* 7–15 mm long, glabrous, base cbracteate at anthesis. *Flower heads* cream, globular, 5–6 mm diam. at anthesis, with 14–16 loosely arranged flowers. *Bractcoles* minute (ca. 0.5 mm long), glabrous; claws short; laminac $\pm$ elliptic, slightly concave. *Flowers* 5-merous, glabrous, obovoid in bud; *calyx* 1/4 (or less) length of corolla, truncate, insignificantly toothed, nerveless; *petals* 2–2.5 mm long, connate for ca. 1/2 their length, $\pm$ nerveless; *ovary* stipitate. *Legumes* $\pm$ moniliform, to 20 cm long and 1 cm wide, pendulous, firmly chartaceous, glabrous, dark to medium brown. *Seeds* longitudinal, globose to $\pm$ elliptic, 8–9 x 7–9 x 3–9 mm, dark brown to black, shiny; *pleurogram* continuous or open towards the hilum, often bordered by a band of yellow tissue; *areole* 3–7 x 1.5–5 mm, often a lighter brown than rest of seed; *funicle* short and filiform, expanded into a thickened straight aril which is often bordered by two narrow fleshy wing-like projections (these disappear with age).

Distribution and habitat: Western Australia; most common in the Shark Bay district from near Denham to the North West Coastal Highway around the 26° parallel. *Acacia microcalyx* has also been collected from Belele Station which is 60 km due north west of Meekatharra. Around Shark Bay this species grows on flat or undulating country in brown loamy sand in association with *Atriplex* and *Arthrocnemum* species. It appears to be absent from the low rocky hills which occur in this area. The specimen from Belele was collected from a saline area in clayey loamy soil.

WESTERN AUSTRALIA: 26° parallel, North West Coastal Highway, T. E. H. Aplin 5214 (dups. CANB, MEL, NY, NSW); 26° parallel, North West Coastal Highway, A. M. Ashby 3204; 13 mi from Denham on road to North West Coastal Highway, S. G. M. Carr 409 (dup. MEL); Belele Station, NW of Meekatharra, R. Hacker s.n., Aug. 1970; 26° parallel, North West Coastal Highway, B. R. Maslin 2774; 2.1 m E of "The Loop" turn-off, E. M. Serymgeour 300.

Flowering and fruiting period: Flowers from February to March; mature legumes have been collected in December and March.

Acacia microcalyx appears to fall in the Uninerves-Racemosae (Bentham, 1864), but the $\pm$ spinescent branchlets are unusual for this group.

The inflorescence and seed characters indicate that *A. microcalyx* is most closely related to *A. sclerosperma* F. Muell. but it is readily distinguished from this species by its $\pm$ spinescent branchlets, its fewer and smaller phyllodes, and its firmly chartaceous legumes.

Acacia microcalyx superficially resembles *A. exocarpoides* W. V. Fitz. (Calamiformes-Plurinerves). Both these species have long, $\pm$ moniliform legumes, and straight, terete, $\pm$ spinescent branchlets which are often devoid of phyllodes (shed upon collection). However, *A. microcalyx* is recognised by its flat phyllodes, its normally racemose inflorescences, and its truncate calyx.

The specific epithet refers to the reduced calyx which is often less than one quarter the length of the corolla.

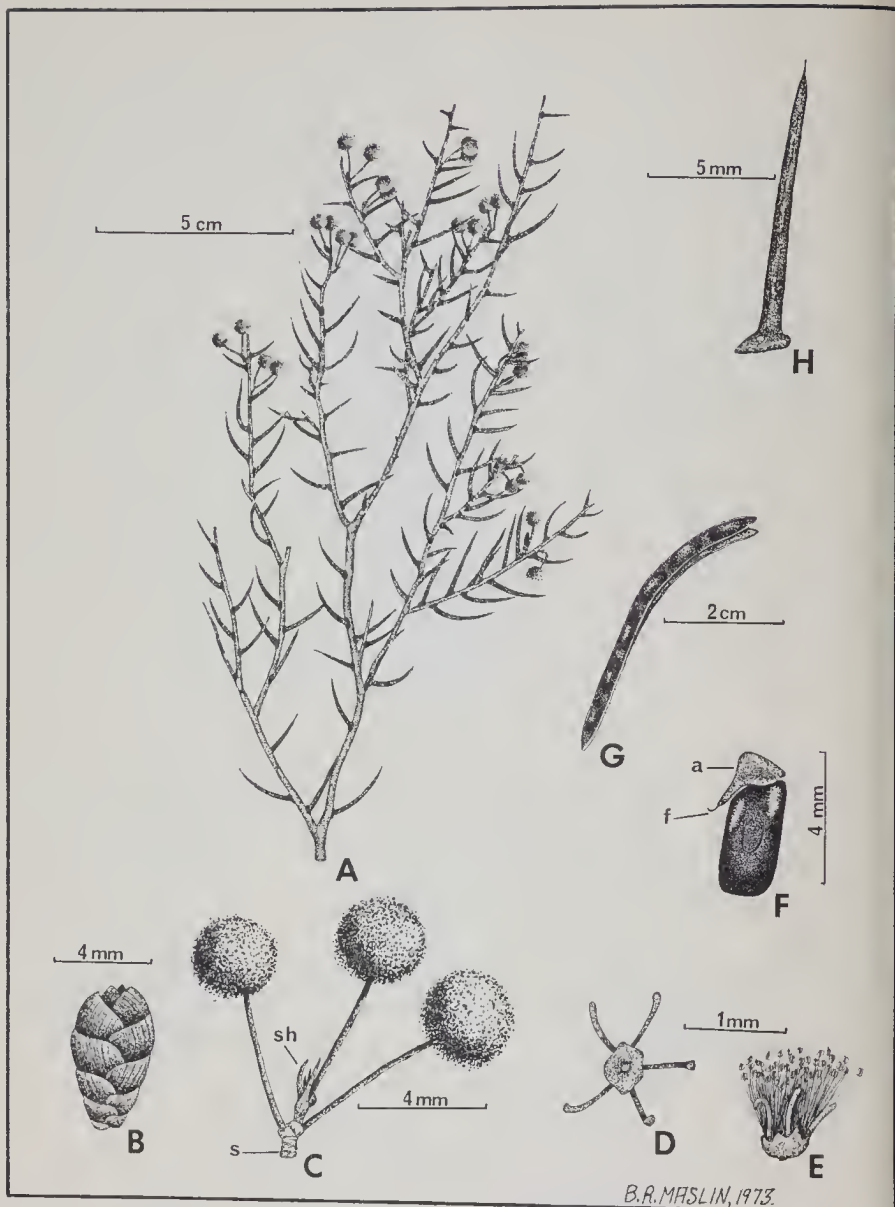


Figure 7—*Acacia pachypoda* sp. nov. A—Portion of branch system. B—Young inflorescence enclosed by conspicuous bracts. C—Raceme showing bract scars (s) on the axis, and new shoot (sh) developing at the apex. D—Flower (from below). E—Flower (side view). F—Seed with minute funicle (f) and pileiform aril (a). G—Legume. H—Phyllode showing dilated base.

A, C, E from P. G. Wilson 7756; B from K. Newbey 2559; D, H from R. D. Royce 3464; F, G from B. R. Maslin 2485.

5. *Acacia pachypoda* B. R. Maslin sp. nov. (Figures 7 and 9).

Frutex ramosissimus paulo diffusus ad 0·7 m altus, 1–2 m diametro. *Phyllodia* rigida, teretia, patentia vel ascendentia, glabra, basibus manifeste dilatatis; *pulvinus* nullus. *Inflorescentia* racemus brevis axillaris bracteas $\pm$ 12 magnas caducas scariosas brunneas ferens, bracteis

superioris capitula juvenia includentibus. *Capitula* globosa, luteola, ca. 8-floribus. *Bracteolae* nullae. *Flos* 5-merus, glaber; *calyx* cupulatus breviter et irregulariter lobatus; *petala* libera, linearia ad lineari-spathulata, 1 mm longa vel minora. *Legumen* lineare, sub-biconvexum, glabrum. *Semina* longitudinalia, oblonga, atro-brunnea.

Type: 5 mi N of Norseman, Western Australia, 8 Aug. 1951, R. D. Royce 3464 (holo: PERTH; iso: K).

Much branched, rather diffuse *shrub* to 0.7 m tall and 1–2 m in diameter; *branches* terete, glabrous; *epidermis* light to medium grey and often peeling. *Stipules* caducous. *Phyllodes* rigid, terete, 7–26 mm long, pungent, straight to slightly curved, patent to $\pm$ ascending, smooth or slightly wrinkled, glabrous, pale green, nerveless, base prominently dilated; *pulvinus* absent. *Gland* inconspicuous, situated on upper surface of phyllode 1–2 mm from the base. *Inflorescence* a short axillary raceme bearing ca. 12 large, caducous, brown, glabrous, finely striate, scarious bracts (basipetally decreasing in size), the upper ones enclosing the developing flower heads; *raceme axis* ca. 1 mm long, glabrous, growing out as a new shoot at the apex; *peduncles* 2–3 per raceme, 5–7 mm long, glabrous. *Flower heads* cream, globular, 3–5 mm diam. at anthesis, with ca. 8 flowers. *Bracteoles* absent. *Flowers* 5-merous, glabrous; *calyx* cupular, less than 0.5 mm long, irregularly shortly lobed, nerveless; *petals* 1 mm (or less) long, free, linear to linear spathulate, nerveless; *ovary* shortly stipitate. *Legumes* linear, 40–50 x 2–3 mm, sub-biconvex, not contracted between the seeds, glabrous, grey-brown; margins not thickened, yellow. *Seed* (only one near-mature sample seen) longitudinal, oblong, 3.5–4 x 1.5–2 mm, dark brown to blackish, shiny; *pleurogram* fine, open towards the hilum; *areole* ca. 1 x 0.5 mm; *funicle* minute, filiform, abruptly thickened into a pileiform aril.

Distribution and habitat: Western Australia; southern goldfields region from near Coolgardie southwards to Kumarl (which is 65 km south of Norseman). *Acacia pachypoda* grows in either rocky brown loam on hillsides or in grey clay on lowlying flatter areas. This species favours shady situations in woodlands where there is not much ground shrub cover.

WESTERN AUSTRALIA: Widgiemooltha area, M. M. Cole 7181; 8 km from Norseman towards Coolgardie, B. R. Maslin 2482; Near Moir Rock, B. R. Maslin 2485; 10 mi S of Coolgardie, K. Newbey 2559; 10 km N of Norseman, P. G. Wilson 7756 (dup. CANB).

Flowering and fruiting period: Flowers in August and September; legumes almost mature in mid-December.

Although *A. pachypoda* appears to occur in the Pungentes-Plurinerves (Bentham, 1864), the nerveless phyllodes and the racemose inflorescences are unusual for this group.

In that this new species has short, terete, pungent phyllodes which lack a pulvinus, it superficially resembles *A. colletioides* Benth. and *A. nyssophylla* F. Muell. However, *A. pachypoda* is readily distinguished from these two species by its nerveless phyllodes with prominently dilated bases, its short racemose inflorescences enclosed by large brown bracts in the bud, its lack of bracteoles, its calyx and corolla morphology, and its pileiform aril.

The specific epithet alludes to the prominently dilated phyllode bases, which are diagnostic for this species.

6. *Acacia redolens* B. R. Maslin sp. nov. (Figures 8 and 9).

Frutex densus expansus saepe rotundatus 1–2(4) m altus, 2–7 m diametro, interdum prostratus, similis vanillae odoratus; *ramuli* resinoso-costati, circa phyllodia minute tomentosi. *Phyllodia* anguste-elliptica ad-obovata, 9–13-nervia. *Inflorescentia* racemus brevis axillaris; *pedunculis* 2–5 per racemo. *Capitula* 4–5 m diam., 20–30-floribus. *Flos* 5-merus, glaber praeter ovarium, aliquantum resinosis; *sepala* oblonga; *petala* 1 mm longa. *Legumen* lineare, glabrum. *Semina* longitudinalia, oblonga ad elliptica, atro-brunnea.

Type: 1 mile east of Ongerup, Western Australia, 16 Sept. 1963, K. Newbey 387D (holo: PERTH; iso: CANB, K, NY).

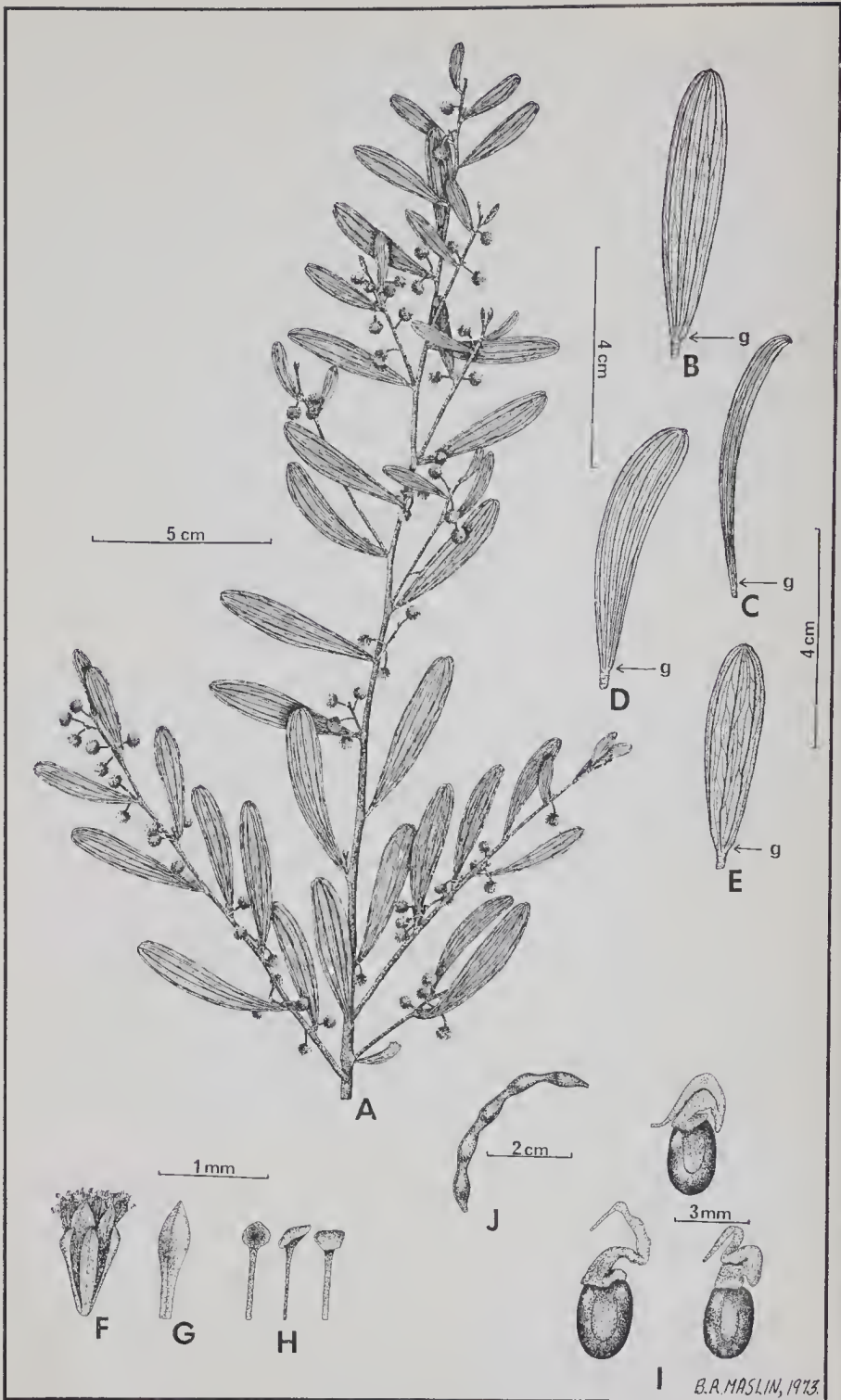


Figure 8—*Acacia redolens* sp. nov. A—Portion of branch system. B to E—Phyllode variation showing gland (g) position. F—Flower. G—Petal. H—Bracteoles. I—Seeds. J—Legume.

A, E, H from K. Newbey 387D; B, F, G from K. Newbey 2634; C from W. E. Blackall 3034; D from P. G. Wilson 10151; I, J from B. R. Maslin 2573.

Dense, spreading, often rounded, fragrant (vanilla scented) *shrub*, 1–2(4) m tall (occasionally prostrate) and 2–7 m in diameter; *bark* smooth, grey; *branches* with prominent, rugose, yellow, resinous ribs (resin soluble in alcohol), minutely tomentose around phyllode base. *Stipules* caducous. *Phyllodes* narrowly elliptic to narrowly obovate, 25–50(60) x (2)6–10(13) mm, straight to slightly falcate, glabrous (except around the pulvinus), grey green to glaucous, 9–13 nerved (3–4 primary nerves diverging from the pulvinar region, intervening nerves less conspicuous), sparsely reticulate, nerves resinous (resin soluble in alcohol), minutely apiculate; *pulvinus* cylindrical, ca. 2 mm long, obscurely transversely rugose, densely and minutely tomentose especially on upper surface. *Gland* not prominent, situated on upper margin of phyllode at distal end of the pulvinus, lamina tissue often swollen around the gland. *Inflorescence* a solitary short axillary raceme or panicle (sometimes a few inflorescences reduced to solitary flower heads); *axis* 2.5–20 mm long, normally densely tomentose and resinous; *peduncles* 2–5 per raceme, 2.5–4 mm long, indumentum as on axis, subtending bract small and solitary. *Flower heads* yellow, globular, 4–5 mm diam. at anthesis, with 20–30 densely packed flowers. *Bracteoles* ca. 0.8 mm long, glabrous; claws linear; laminae sub-peltate. *Flowers* 5-merous, glabrous (except for ovary) and somewhat resinous; *sepals* 2/3–3/4 length of petals, shortly united at the base, oblong, obscurely 1-nerved, slightly thickened and inflexed at the apex; *petals* 1 mm long, free, obscurely 1-nerved; *ovary* very sparsely papillate. *Legumes* linear, 20–60 x 2–3 mm, slightly contracted between the seeds, surface prominently undulate, glabrous, slightly resinous, light brown; margins slightly thickened. *Seeds* longitudinal, oblong to elliptic, 3.5–4 x 2–2.5 mm, dark brown to blackish, $\pm$ shiny; *pleurogram* open towards the hilum; *areole* ca. 2 x 1 mm; *finicle* often flattened, reflexed below a once or twice folded, $\pm$ convoluted, thickened, cream or white coloured aril which is $\pm$ dilated at the hilum.

Distribution and habitat: South-west Western Australia; southern regions from about Ongerup to Ravensthorpe and extending northwards to Pingrup and Newdegate. *Acacia redolens* grows in slightly saline or alkaline loam or clay often in association with Salmon Gums (*Eucalyptus salmonophloia* F. Muell.). In the northern parts of its range (around Pingrup and Newdegate) this species often grows with Stocking Gum (*E. kondininensis* Maiden and Blakely) in sandy loamy soil around the margins of salt lakes. For further details see discussion below.

WESTERN AUSTRALIA: Pingrup, W. E. Blackall 3034; Ongerup, E. M. Canning 7437; South of Mount Madden, J. Goodwin 226 (UWA); 9.6 km E of Ravensthorpe towards Esperance, B. R. Maslin 2573; ca. 12 mi NW of Ravensthorpe, K. Newbey 2634; 312 mile post on Lake King-Ravensthorpe road, R. A. Saffrey 349 (duplicates at BRI, MEL, NSW); Fitzgerald River Reserve, P. G. Wilson 10151.

Flowering and fruiting period: Flowers from August to October; mature legumes present in December.

According to Bentham's classification (1864) *A. redolens* is placed in the Plurinerves–Nervosae.

Acacia redolens appears to be most closely related to *A. ixiophylla* Benth. The latter species is also resinous (but the resin is more generally distributed over the branch and phyllode surface, not confined to ribs as in *A. redolens*) and has short axillary racemes (but always with two flower heads). *Acacia redolens* is further distinguished from *A. ixiophylla* by its normally larger, narrowly elliptic to narrowly obovate phyllodes (which have more prominent primary nerves and fewer anastomoses), and by its gland being positioned at the distal end of the pulvinus (not some millimetres above it as in *A. ixiophylla*).

In its phyllode morphology *A. redolens* superficially resembles *A. cyclops* Cunn. ex Don (which, like *A. ixiophylla*, has racemes consisting of two flower

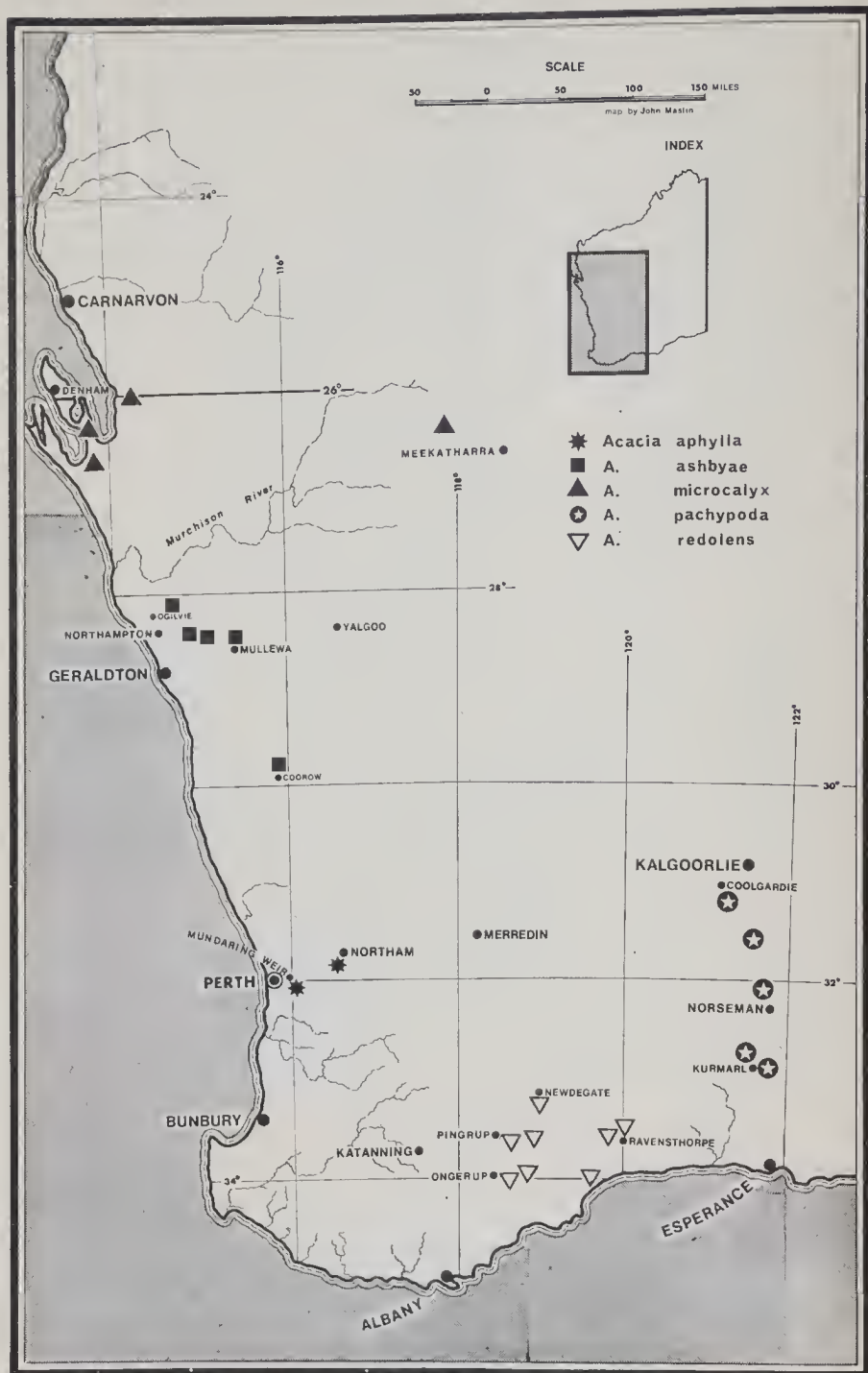


Figure 9—Distribution of *Acacia aphylla*, *A. ashbyae*, *A. microcalyx*, *A. pachypoda*, and *A. redolens*.

heads). However, *A. cyclops* can be readily recognized by its glabrous and non-resinous branchlets, raceme axes, and peduncles, by its shortly lobed calyx, by its larger flower heads, legumes, and seeds, and by its orange or scarlet funicle which encircles the seed.

In the Ongerup-Ravensthorpe area *A. redolens* grows as a dense, $\pm$ rounded shrub, 1–2 m tall. Further north, however, this species becomes more upright and openly branched (reaching 3 m tall). In the lower Fitzgerald River area (south-west of Ravensthorpe) *A. redolens* grows into a moderately dense shrub up to 4 m tall.

In 1962, Mr. R. Pecoff of Pecoff Brothers Nursery, California, collected seed of *A. redolens* from plants growing at Ongerup. The seedlings which were subsequently germinated produced some forms that were more prostrate than others. As the species at that time was not described, Pecoff registered the cultivar name "Ongerup" for the most prostrate plant, and all his stock since has been grown from cuttings derived from this original specimen. This species is now grown in Florida, Georgia, Texas, Arizona, and California, where it is used in soil erosion control programmes, in the landseaping of median strips on highways, and in the reclamation of dredged soils containing sand, sodium salt, sea shells, and clay. *Acacia redolens* has a deep fibrous root system; it grows exceptionally well (in the U.S.A.) on the coast under extreme conditions without any wind burn damage. (Above information from Pecoff Brothers Nursery Catalogue, 1968, and from Mr. K. Newbey, pers. comm.)

The specific epithet alludes to the distinctive odour (vanilla scented) which is emitted from the plants, especially during the hotter part of the day.

Acknowledgements

The author expresses his appreciation of the generous assistance given by the following people:—Miss Alison Ashby, Mr. Ken Newbey, and Mr. Garry Phillips for their field observations on some of the species contained herein; Mr. Alex George for providing the latin descriptions; Mr. John Maconochie for information concerning *A. ampliceps* and *A. salicina* in Northern Territory; Mr. John Maslin for drafting the distribution maps of Western Australia; Mr. Les Pedley who, as Botanical Liaison Officer at Kew in 1971, checked the type of *A. varians* and also made valuable comments concerning *A. salicina*; Dr. Mary Tindale for information concerning *A. ampliceps* at the National Herbarium, Sydney (NSW); and the Director, Royal Botanic Gardens, Kew, for the loan of the type of *A. varians*.

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Studies in the genus *Acacia*—3

—The taxonomy of *A. saligna* (Labill.) H. Wendl.—

By B. R. Maslin

Abstract

Confusion over the application of the two names *Acacia saligna* (Labill.) H. Wendl. (1820) and *A. cyanophylla* Lindl. (1839) is discussed. These two species are considered to be synonymous. *Acacia saligna* is lectotypified, a description is provided, and the morphological variation is discussed.

Introduction

The application of the two names *A. saligna* (Labill.) H. Wendl. and *A. cyanophylla* Lindl. has long been a source of confusion for taxonomists. Benth (1837) regarded these species as synonymous, but in 1842 and 1864 he treated them as separate taxa (commenting on their similarity). Herbert (1920) discussed the differences between what he believed to be *A. saligna* and *A. cyanophylla*. It is worth noting that Herbert erroneously gave the type locality of *A. saligna* as King George Sound (which is Albany, 300 miles west of the actual type locality, Esperance). The state of confusion between these two species has been carried over to the present day.

Neither Benth nor Herbert saw the type collection of *A. saligna*; had they done so they would have seen that it consisted of a mixture of two taxa (see below). The lectotype of *A. saligna* as here selected represents the same taxon that was later described as *A. cyanophylla*. Actually, what Benth and Herbert thought to be two separate taxa are in fact the one variable species, *A. saligna*.

Type specimens

Acacia saligna (Labill.) H. Wendl. (1820) was based on *Mimosa saligna* Labill. (1807). At Florence (FI), where much of Labillardière's collection is housed, there are four sheets which could have been used for drawing up the description of *M. saligna* (see Figure 1). This possible syntype material is a mixture of two taxa: one sheet is *A. saligna* (sensu lectotypico—Figure 1B); one sheet is *A. ligulata* Cunn. ex Benth. (attached to this is Labillardière's manuscript description of *Mimosa saligna* and, in addition, this sheet is labelled "Typus", which in view of the present lectotypification is incorrect—Figure 1C); while the two remaining sheets carry a mixture of these taxa (Figures 1A and 1D). The left hand specimen on the mixed sheet labelled "Herb. Webbianum. Ex Herb. Labillardière. Terra Diemen" (with no other details) is here selected as the lectotype of *A. saligna* (Figure 1A). This specimen represents the taxon later described as *A. cyanophylla* Lindl., which therefore becomes a taxonomic synonym of *A. saligna*. In order to preserve current usage, none of the specimens of *A. ligulata* were chosen as the lectotype of *A. saligna*. At Melbourne (MEL) there are two fragments (ex FI) from Labillardière's collection; these are *A. saligna* and *A. ligulata*.

The particular form of *A. ligulata* represented in the type collection differs (in part) from *A. saligna* in that its phyllodes are shorter, narrower, and have less prominent midribs, and its calyx is smaller and sinuate-toothed. Labillardière apparently recognized these differences but was unsure of their significance, for pinned to the *A. saligna* sheet (Figure 1B) is the following note in his hand "varietas ? fol. angustioribus, brevioribusque. in floribus omnia eadem, calyce tamen minori, dentibusque brevioribus." Undoubtedly this note refers to *A. ligulata*, but it has erroneously been attached to the *A. saligna* specimen.

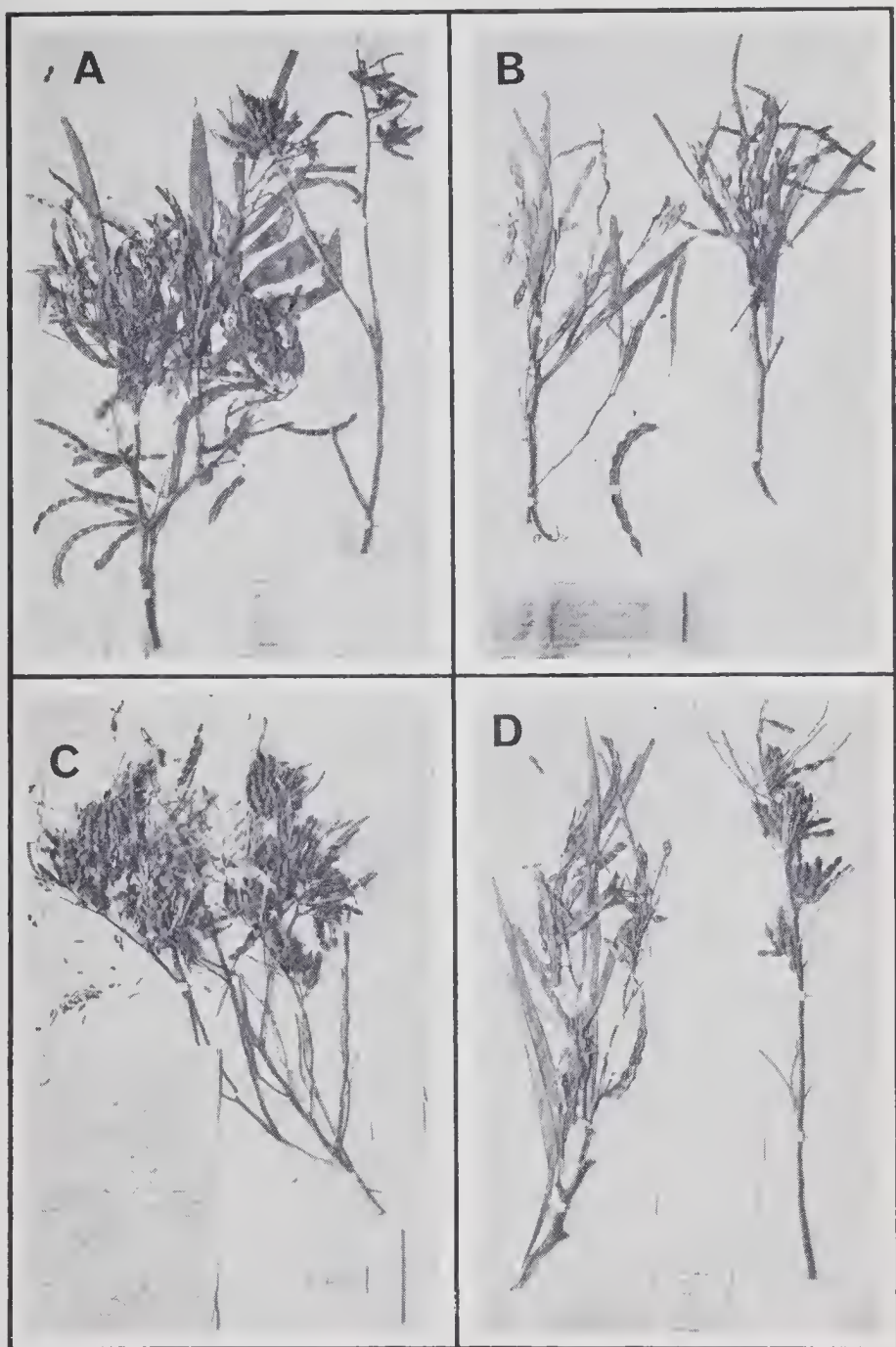


Figure 1—Type collection of *A. saligna* at Florence. A—*Acacia ligulata* (right hand specimen) and lectotype of *A. saligna* (left hand specimen). B—*Acacia saligna*. C—*Acacia ligulata* (incorrectly labelled “Typus”). D—*Acacia ligulata* (right hand specimen) and *A. saligna* (left hand specimen).

In the original description of *Mimosa saligna*, no mention is made of a narrow phyllode variety (although De Candolle, 1825, p. 450, did comment on this point). Labillardière apparently combined the characters of *A. saligna* and *A. ligulata* in his description, but the plate accompanying this text definitely depicts *A. saligna*.

The type of *A. cyanophylla* is at Cambridge (CGE), and a photograph of it has been seen by the author. It was collected by Capt. James Mangles from the Swan River (i.e. in the vicinity of Perth on the west coast of Western Australia).

Historical notes

Labillardière was one of the naturalists who accompanied the D'Entrecasteau expedition that landed in Western Australia at Esperance Bay* and again in Tasmania (Terre Van Diemen) in 1792–93 while searching for the lost La Pérouse expedition. Labillardière made collections from one of the islands in the Bay (perhaps Woody Island—see Willis, 1953) and also from the nearby mainland while searching for a lost member of the expedition.

Willis (1953 and 1959) does not list *A. saligna* for any of the Recherche islands that he visited. However, on the mainland, at least around Esperance, *A. saligna* and *A. ligulata* occur together, thus explaining the mixture of type material at Florence. Considering this, and also because neither *A. saligna* nor *A. ligulata* occurs in Tasmania, it is apparent that the locality “capite Van-Diemen” given in the original description (“Terra Diemen” on the lectotype) of *A. saligna* is an error. The correct locality should have been “terra Van Leuwin”, a name which Labillardière used to refer to Esperance Bay (see Stafleu, 1967 p. 24). A similar error in locality citation has occurred in *Leptospermum sericeum* Labill. (see Gardner, 1964, p. 61).

Taxonomy

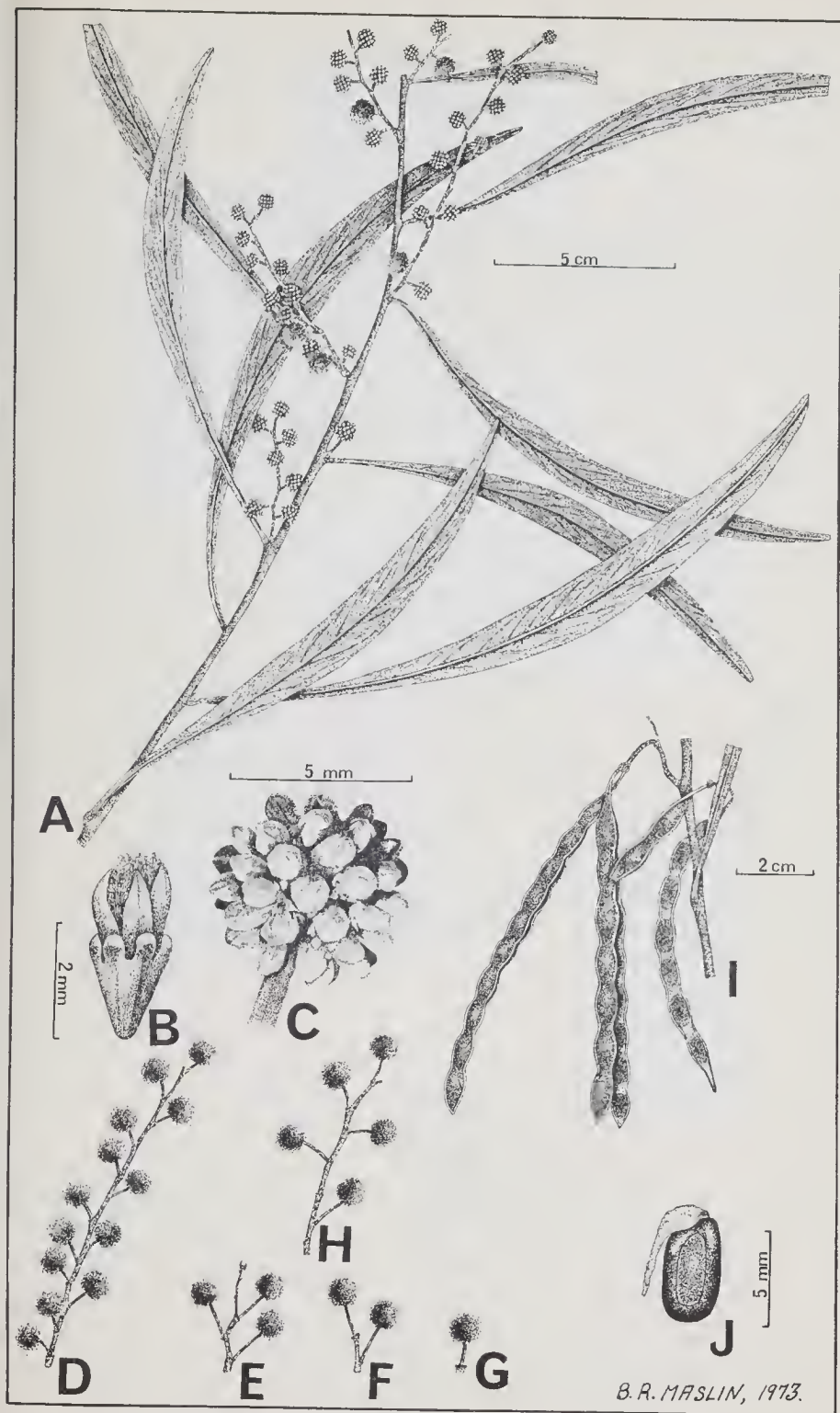
Acacia saligna (Labill.) H. Wendl., Comment. Acac. 4, 26 (1820).—Figs. 2 & 3.

Mimosa saligna Labill., Nov. Holl. Plant. Specim. 2:86 t.235 (1807). Lectotype: “Terra Diemen. Herb. Webbium. Ex Herb. Labillardière”—left hand specimen. (FI—photograph seen.)

Acacia cyanophylla Lindl. Edward's Bot. Reg. 25: Misc. 45 (1839). Holotype: Swan River, J. Mangles. (CGE—photograph seen.)

Dense *shrub or small tree* 2–6(10) m tall; *trunk* solitary or dividing near base into a few main branches; *bark* smooth and grey to red brown on branchlets and juvenile plants, dark grey and fissured with age; *branchlets* often pendulous, terete but often flattened towards the apex, normally slightly flexuose, finely ribbed, glabrous, often glaucous when young. *Stipules* caducous. *Phyllodes* variable, linear to lanceolate, 8–25 x 0.4–2.0 cm (often much larger towards the base of the plant, 20–32 x (3)4–8 cm), straight or falcate, often pendulous, glabrous, green to glaucous, dull to shiny, midrib conspicuous, lateral veins fine (absent on very narrow phyllodes); *pulvinus* 1–2(3) mm long, rugose. *Gland* solitary, situated on upper margin of phyllode at (or near) distal end of pulvinus, oblong to circular, 1–2 mm diam. *Inflorescence* racemose (occasionally reduced to a single flower head), axillary but sometimes terminal; *axis* 0.3–3(6) cm long, glabrous; *peduncles* (1)2–10(13) per raceme, 5–15 mm long (to 25 mm when in fruit), glabrous. *Flower heads* bright yellow, globular, (5)7–8(10) mm diam. at anthesis, with 25–55(78) flowers. *Bracteoles* 1–1.5 mm long, sparsely pilose; claws linear; laminae inflexed. *Flowers* 5-merous; *calyx* 1/2–2/3 length of corolla, shortly lobed, lobes obtuse $\pm$ thickened inflexed and glabrous or minutely ciliolate, tube normally glabrous; *petals* (1.5)2–3 mm long, connate for 2/3–3/4 their length, glabrous, 1-nerved

* Esperance is situated on the south coast of Western Australia on Esperance Bay, into which the Recherche Archipelago extends.



B. R. MASLIN, 1973.

Figure 2—*Acacia saligna*. A—Portion of branch. B—Flower. C—Flower head. D to H—Inflorescence variability. I—Legumes. J—Seed. A from C. Andrews s.n.; B-D from A. Morrison s.n.; E from T. E. H. Aplin 830; F-G from A. M. Ashby 3682; H from A. M. Ashby 3672; I from C. A. Gardner s.n.; J from B. R. Maslin 3204.

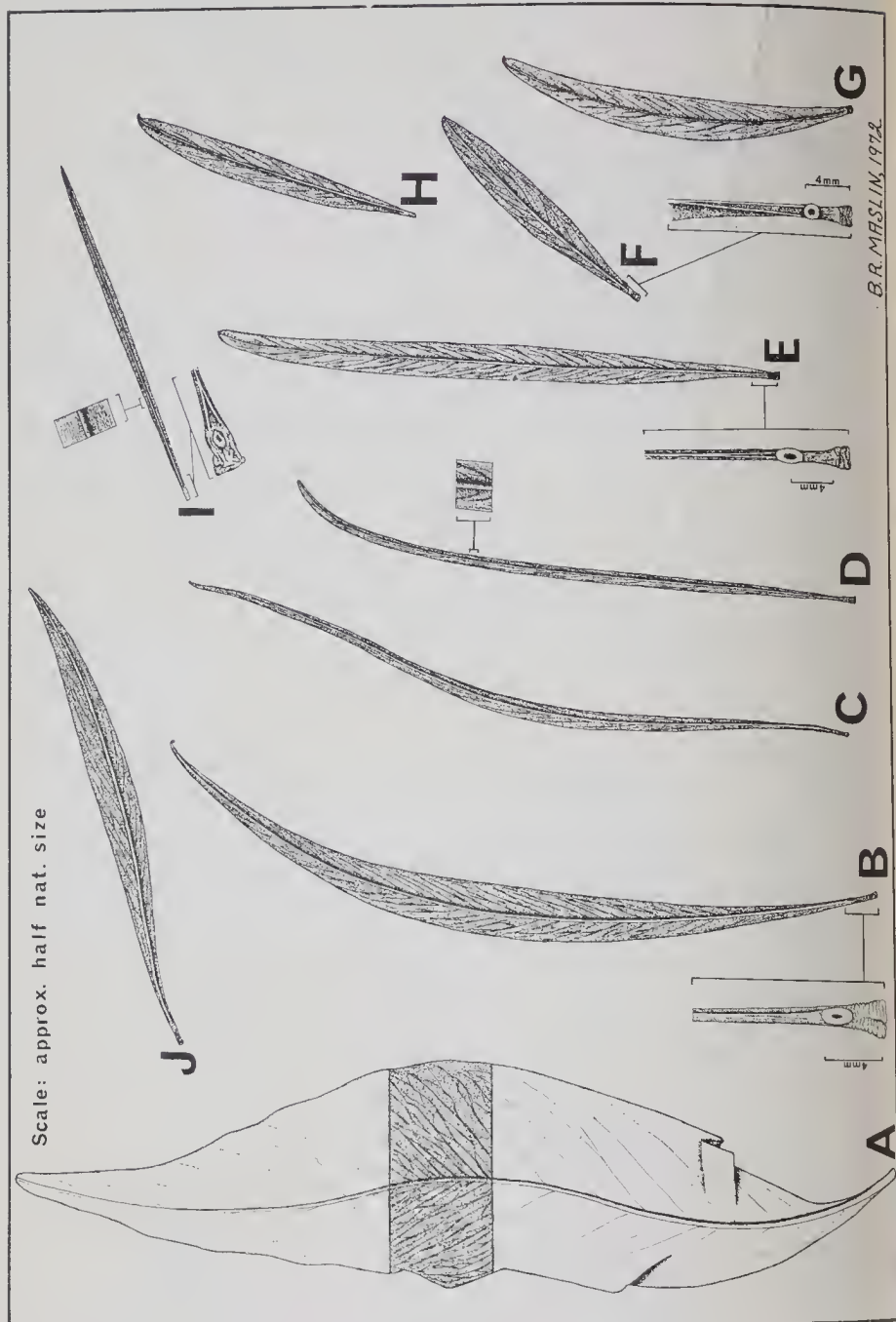


Figure 3—*Acacia saligna* showing phyllode and gland variability.

A from B. R. Maslin 1629; B from B. R. Maslin 1627; C from B. R. Maslin 1628; D from A. M. Ashby 3683; E from A. S. George 1555; F from Long 74; G from A. C. Burns 13; H from Gardner and Blackall s.n.; I from W. E. Blackall 1109; J. from Kimber 178.

(nerve often indistinct); ovary glabrous. *Legumes* linear, (3)8–12(14) x 0.4–0.6 cm, slightly contracted between seeds, surface slightly undulate, glabrous, brown; margins slightly thickened, yellow. *Seed* longitudinal, oblong to slightly elliptic, (4)5–6 x (2.5)3–3.5 mm, dark brown to black, shiny; *pleurogram* prominent, continuous, often bordered by light coloured tissue; *areole* 3–3.5 x 1–1.5 mm; *funicle* clavate, straight (occasionally folded), yellowish, narrowed and dark brown at the hilum.

Distribution and habitat: (Fig. 4) South-west Western Australia: in general terms, west of a line extending from the Murchison River (around Ajana) to Mount Ragged (which is about 150 km east north east of Esperance). This species is also cultivated in the Eastern States as well as abroad—see below. *Acacia saligna* is very common on the poor sandy soils of the Swan Coastal Plain from about Gingin southward to Busselton, and also on the heavier clayey soil around Geraldton. In many places, for example the sandplains north of Gingin, the Darling Range, and the Great Southern (from about Williams southward to Manjimup and Mount Barker), *A. saligna* is more or less restricted to creeks and rivers. It is quite common along the south coast from Albany to Esperance, but it is best developed in the deep sands and loams associated with the water courses throughout this area. In the wheatbelt (from about Kellerberrin to Lake King), *A. saligna* is restricted to the base of many of the large granite rocks which are common there, e.g. Jilakin Rock, Merredin Rock, Pallarup Rocks, and Mounts Hampton, Stirling, and Gibbs. In places, *A. saligna* occurs on the coastal dune system, here it often forms dense thickets in the hollows between the sand hills.

WESTERN AUSTRALIA: Gingin, *W. B. Alexander* s.n., Sept. 1919; Claremont, *C. Andrews* s.n., Aug. 1902; Pingelly, *T. E. H. Aplin* 830; Near Lake Muir, *A. M. Ashby* 3672 (dup. RSA); Near East Cranbrook, *A. M. Ashby* 3682 (dup. E); North of Cranbrook, *A. M. Ashby* 3683 (dup. NSW); Mount Gibbs, *J. S. Beard* 3710; Banks of Murchison River, Galena, *W. E. Blackall* 609; Gibsons Soak, *W. E. Blackall* 1109; 36 mi west of Dalwallinu, *M. I. H. Brooker* 1910; 3 mi north of Geraldton, *A. C. Burns* 13; Muntadgin, *E. T. Bailey* 147; Esperance, *C. A. Gardner* s.n., 18 Dec. 1940; Mount Stirling, *C. A. Gardner* 6527; Cape Le Grand, *C. A. Gardner* 14119; Banks of Gairdner River, *Gardner and Blackall* s.n., Oct. 1928; Pallarup Rocks, *A. S. George* 1555; Mount Barker, *Goadby* s.n., Oct. 1898; 14 mi west of Northam, *J. W. Green* 539; Yanchep National Park, *A. M. James* 287; Dwellingup area, *P. C. Kimber* 178; 30 mi east of Geraldton, *Long* 74; Wongan Hills, *Lullfitz* 1646; Jilakin Rock, *C. V. Malcolm* s.n., 24 Oct. 1959; Perth metropolitan area, *B. R. Maslin* 1627, 1628, 1629 (dups. NSW); Esperance, *B. R. Maslin* 3204; Mount Hampton, *N. L. McKenzie* 252; Cannington, *A. Morrison* s.n., 1 Aug. 1903; 1 mi east of Ongerup, *K. Newbey* 557; West Australia, *Oldfield* s.n. (ex MEL); Merredin, *R. D. Royce* 9051; Near Moora, *F. W. Went* 120; Mount Ragged, *P. G. Wilson* 10,090 (dup. K).

Flowering and fruiting periods: Flowers from August to October; mature legumes present from November to January.

Domin (1923) described *A. cyanophylla* var. *dorrienii* from material collected by A. A. Dorrien-Smith from Yallingup and Cape Naturaliste. Although I have not seen the type, I have made collections in the above region, and it appears as though var. *dorrienii* is in fact, *A. rostelifera*.

Bentham (1864) gave *A. leiophylla* Benth. as a synonym of *A. saligna*. Having examined photographs of the syntypes of *A. leiophylla* ("King George's Sound, Baxter"—in flower and in fruit), I think Bentham was incorrect when he effected this synonymy. However, until the types of *A. leiophylla* have been critically examined, the identity of this species remains in doubt.

As mentioned above, *A. saligna* is a polymorphic species and its range of variation includes *A. cyanophylla*. In general, previous authors have attempted to distinguish these two species by using habit, phyllode and funicle morphology, number of flowers per flower head, and petal nervation. However, these are variable characters and cannot be used to separate *A. saligna* and *A. cyanophylla*.

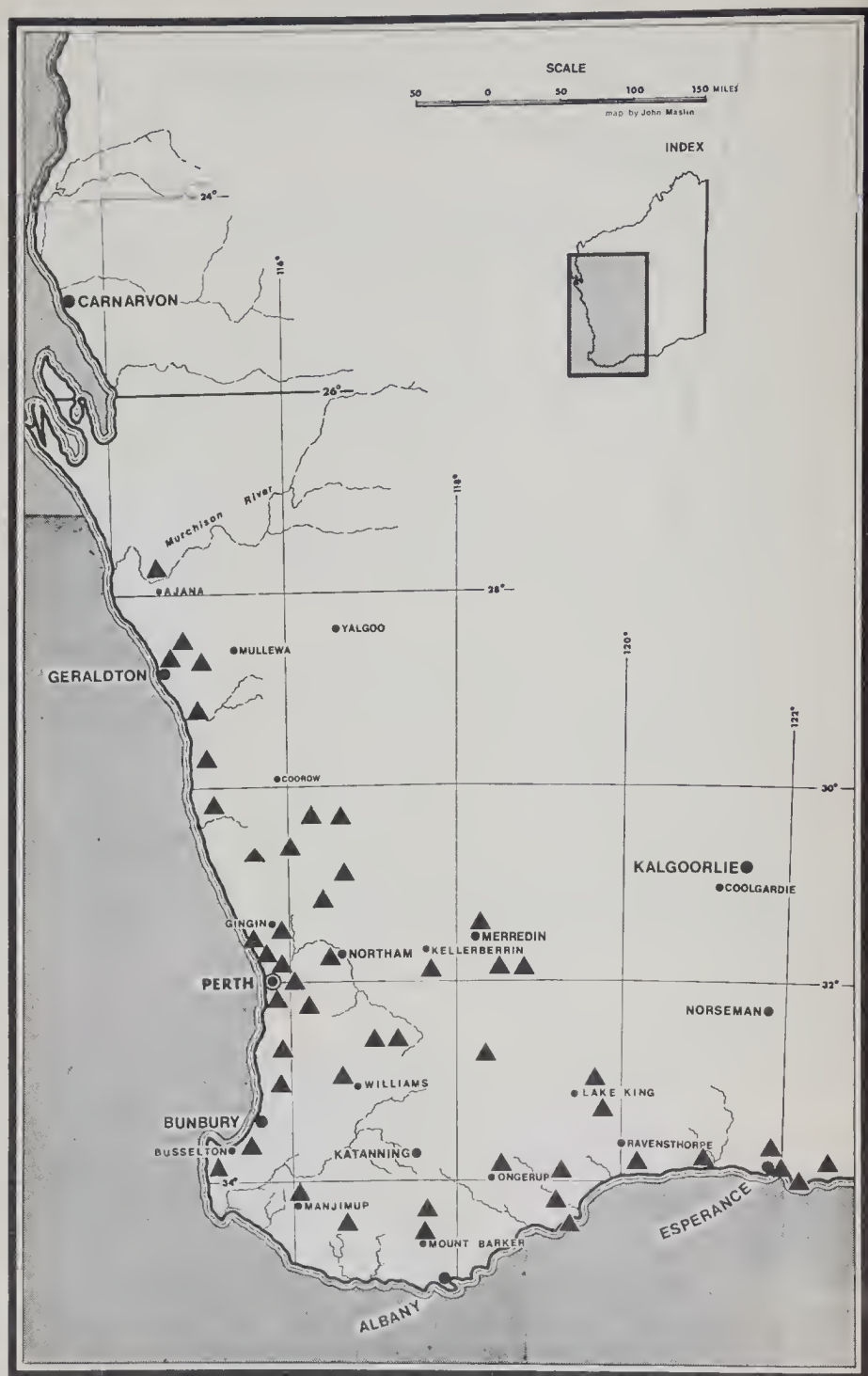


Figure 4—Distribution of *A. saligna*.

Acacia saligna is commonly a shrub, but it also grows into a small tree, especially in areas away from competition with other plants. The young shrubs, particularly on the Swan Coastal Plain, often have a dense glaucous foliage with conspicuously larger phyllodes towards the base of the plant. However, in other areas (e.g. around Geraldton) the larger basal phyllodes are absent and the foliage is not at all glaucous. As is evident from herbarium specimens as well as from field observations, the shape and size of the mature phyllodes vary considerably (Figure 3). The raceme axis ranges from 0.3 to 3(6) cm in length and bears (1)2–10(13) flower heads of 22–55(78) flowers. On a single specimen the axis can vary from 0.3 to 1.8 cm and the flowers from 26–42 per head. Sometimes the inflorescence is reduced to a single flower head with the peduncle articulated on a very short raceme axis (Figure 2G). Occasionally the apex of the raceme axis develops into a vegetative shoot: this has been observed on some individuals from the Geraldton and Wheatbelt regions. The funicle is normally clavate and yellowish with a brown coloured constriction at the hilum. Occasionally it is folded in the middle but has never been observed by the author to be thickened and folded at the hilar end as depicted by Herbert (i.e.) in figures 6 and 6a.

Acacia saligna appears to be closely related to *A. pycnantha* Benth. (an Eastern States species); however, the latter is distinguished by its stouter raceme axes and peduncles, its prominently tapered phyllode bases, its longer pulvinus, and its smaller glands.

In its growth habit, phyllode morphology, glabrous racemes, and large flower heads, *A. saligna* superficially resembles *A. ampliceps* B. R. Maslin (Nyctia 1(4): 315). However, the flowers, legumes, and seeds of these two species are quite different.

Acacia saligna is occasionally confused with *A. microbotrya* Benth. and *A. rostellifera* Benth. but the legumes and seeds of these three species are different. In addition, *A. microbotrya* is distinguished by its smaller flower heads, its strigose raceme axes and peduncles, and its less prominent glands, while *A. rostellifera* differs in its truncate calyx and its phyllodes, which have a small gland near the apical mucrone as well as a marginal gland situated about 1 cm above the pulvinus.

Acacia saligna is an endemic Western Australian species, but it has been extensively cultivated (often under the name, *A. cyanophylla*) in the Eastern States as well as abroad, both for its horticultural value and as a source of tannin. As a young shrub it is normally quite attractive with its dense, sometimes glaucous, foliage and its bright yellow flower heads. As it matures, however, it often becomes openly branched and somewhat untidy; it is also susceptible to attack by the Gall Rust *Uromycladium tepperianum* (Sacc.) MeAlpine (see Gathe, 1971).

Acacia saligna makes quick regrowth (both from suckers and from seedlings) after fire or clearing, especially along road verges. The robust seedlings are able to compete successfully with the introduced grasses that also commonly invade these disturbed areas. According to Newbey (1968 and pers. comm.) *A. saligna* is a good species for soil erosion control because it is quick growing and has an extensive root system. This species was introduced into South Africa around 1845 where it was used to stabilize sand in the Cape Flats area. It has since spread beyond the confines of the Flats and is now considered an undesirable plant in South Africa (Roux, 1961).

Acknowledgements

The author wishes to thank the following people for their valuable assistance throughout this study: Mr. A. B. Court, National Herbarium of Victoria, Melbourne, who first drew my attention to the mixture of material at Florence;

Mr. G. Chippendale, while Australian Botanical Liaison Officer at Kew, for photographing the type collection of *A. saligna* at Florence; Mr. J. Maslin for drafting the distribution map contained herein; Messrs. G. Grewar of Esperance and K. Newbey of Ongerup for providing me with valuable field observations on *A. saligna*; and the Director of the National Herbarium of Victoria, Melbourne, for permission to consult fragments of the type collection of *A. saligna* held by that institution.

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A new species of *Phebalium* from south-eastern New South Wales

By P. G. Wilson

Abstract

Phebalium ellipticum sp. nov. is described from collections made in the mountain ranges to the east of Cooma, New South Wales. It is placed with *P. ovatifolium* and *P. squameum* in the section *Eriostemoides*.

Phebalium ellipticum P. G. Wilson sp. nov. (Figure 1).

Folia elliptica, 20 x 8–35 x 15 mm, chartacea, retusa, supra glabra, infra lepidota. *Inflorescentiae* axillares, ca. 10 mm longae, 2–5 florum; pedicelli ca. 2 mm longi, bracteolis duabus linearibus minutis caducis ornatis. *Sepala* libera, ca. 1 mm longa, glabra. *Petala* elliptica, ca. 5 mm longa, glabra, alba. *Stamina* petala aequantia, filamentis subulatis glabris, antheris ellipticis retusis. *Discus* ca. 0.5 mm altus, glaber. *Ovarium* lepidotum; stylus glaber; stigma minutum integrum.

Type: East slope of Big Badja Mountain just below summit "Leaning bushy shrub with numerous branches arising from base, ca. 1 m high; common among bushy shrubs above tree line", 27 Oct. 1972, *J. P. Baker* 907 (holo: NSW; iso: CANB, GAUBA, K, MEL, PERTH).

Bushy shrub to 1.5 m high. Branches terete, lepidote, sparsely to densely glandular verrucose. Leaves shortly petiolate; lamina flat, elliptical, 20 x 8–35 x 15 mm, retuse, firmly chartaceous, glabrous above, closely silvery lepidote below. Inflorescences of short axillary 2–5 flowered cymes ca. 10 mm long; bracts subfoliaceous (but small), very reduced upwards, caducous; bracteoles 2, minute and linear, situated in middle of the short (ca. 2 mm) pedicel, caducous. Sepals free, triangular, ca. 1 mm long, fleshy, glabrous (or sparsely lepidote when young). Petals slightly imbricate, elliptical, ca. 5 mm long, glabrous, white. Ovary hemispherical, ca. 1 mm high, silvery lepidote; style slender, terete, glabrous, ca. 2 mm long; stigma entire, equal in width to style. Fruit: cocci spreading, quadrate, very shortly apiculate, 3 mm long; seed not seen.

Distribution: on mountains south and east of Cooma, in the extreme south-east of New South Wales.

NEW SOUTH WALES: "East of Nimitybelle" (= Nimmitabel), head of Howitt's Swamp, 9 Feb. 1908, *R. H. Cambage* 1862 (NSW, SYD); Big Badja Mtn., ca. 20 mi E of Cooma, alt. ca. 4000 ft., 23 Oct. 1971, *J. Webb* (GAUBA).

This species belongs to the section *Eriostemoides* whose other two members are *Phebalium ovatifolium* and *P. squameum*. The distribution of this section is from Tasmania northwards to the south-eastern extremity of Queensland. *Phebalium ellipticum* therefore occupies a central position in relation to the distribution of the section as a whole.

In a revision of the genus *Phebalium* by the present author* reference was made in a note under "*Phebalium* sp. aff. *squameum*" (p. 95) to a vegetative specimen, Cambage 1862. This specimen belongs to *P. ellipticum*. It was stated in that paper that the specimen resembled in leaf form the Tasmanian plant *P. squameum* subsp. *retusum*. From this taxon it may be clearly distinguished in the flowering condition by the presence of a lepidote ovary. From *P. ovatifolium*, to which it also bears a resemblance, it may be distinguished by its much larger leaves and by the absence of the prominent and persistent bracteoles which characterize the former species.

* Nuytsia 1:1–155 (1970).



Figure 1—*Phebalium ellipticum* sp. nov. Holotype NSW ex GAUBA, J. P. Baker 907.

Phebalium ellipticum is not the same species as the collection Gates no. 12 (from Woods Point, Goulburn River, Victoria) which, in the revision, was referred to as *Phebalium* sp. aff. *squameum*. This collection represents an as yet undescribed species which differs from *P. ellipticum* most obviously in having lepidote petals and sepals.

Acknowledgements

I am grateful to Mr. J. P. Baker, of the Department of Botany at the Australian National University, who, through his efforts in obtaining suitable material of *Phebalium ellipticum*, made this paper possible.

Ptilotus alexandri Benl sp. nov. (Amaranthaceae)

By G. Benl, F.L.S.*

Abstract

A description and an illustration are presented of a new species of *Ptilotus* from Western Australia. The type specimens are cited and the resemblance to other taxa is fully discussed.

Ptilotus alexandri Benl sp. nov. (Figure 1)

Descriptio. Herba annua humilis pilosa, plerumque caespites parvos pulviniformes rotundos formans, pleio- vel polystachya, spicis intense roseis ornata.

Caules—in speciminibus exstantibus usque ad 9— e radice fusiformi lignoso (as 20 cm longo) orientes, 4–14 cm longi et 0,5–1,5 mm diametro, centrales erecti, extranei (curvati-) adscendentes, iuveniles graciles teretiusculi, adulti superne sulcati, pallidi- vel sordidi-virides, partim cinerei, hirsuti, per totam longitudinem pilis albis dendroideis, rectanguli-patentibus, breviter articulatis, in articulis distincte verticillati-ramosis, 1–1,8 mm (ramulis pilorum ad 0,06 mm) longis vestiti, foliati, rarius usque ad inflorescentiam unicam indivisi, saepius cum 1–5 ramis lateralibus (fig. 1A) onusti vel modice corymbosi-ramosi, ramis ramulisque approximatis 1–5 cm longis, pedunculum et rhachidem spicarum formantibus.

Folia integerrima, nervo medio subtus prominente, apiculata sive mucronata (mucrone conspicuo ad 1 mm longo), in statu sicco rugosa et quasi furfuracea, incani-cinerascentia, utrimque villosa (pilis sicut in caulibus, vix maioribus, postea laminae plus minusve adiacentibus), ceterum inaequalia: basalia subcoriacea spathulata, ad 15 congesta, usque ad 8:1,8 cm longa lataque, laminis in petiolum longum (3,5 cm) superne alatum gradatim contractis, demum glabrescentia; caulina alterna 1,8–0,3 cm distantia, satis tenera et semper pilosa, inferiora angusti-spathulata et distincte petiolata, superiora erectiuscula (fig. 1A) obovata basi petioliformi, summa lanceolata subsessilia, spicas versus ad 0,4:0,2 cm decrescentia.

Spicae molles primo subhemisphaericae (1,8 cm diametro), dein conici-oblongae (2,5: 2 cm), demum (oblongi-) cylindraceae ad 3,2 cm longae et 2 cm latae, terminales—singulae ad ternae caules et ramos terminantes—vel laterales pedicellatae, numquam sessiles, hoc modo in racemum subdensum cumulatae, pedicello (ramulo) 1–3 cm fere longo, plerumque folio vel foliis nonnullis praedito, colore tepalorum conspicuae. Rhachis pilis ad 1 mm longis densissime induta.

Flores 30 ad 70 collecti, bracteis duplo fere longiores, apicibus lucidis tepalorum exteriorum spectabiles.

Bracteae bracteolaeque scariosae integerrimae, apice acuminatae, in parte ima spicae post lapsum perianthii superstites, inaequales: *Bractea* (fig. 1B) ovati-lanceolata, 5–6 mm longa et 1,8–2 mm lata, rigidula, impellucida, fuscescens, apice sensim in mucronem fuscum (0,8 mm) producto, dorso omnino haud densissime piloso, pilis denticulati-nodosis ad 2 mm (denticulis 0,02–0,025 mm) longis, apicem haud attingentibus. *Bracteolae* (fig. 1C) vix longiores sed latiores (2,5 mm), oblongi-ovatae, concavae, tenues membranacei-diaphanae, incoloratae, nitentes, primo carinulae perianthio arcte adpressae, nervo medio in mucronem distinctum notabilem (1 mm) dilute fuscum egrediente, pubescentia ad partem medianam restricta, pilis rectis e carina orientibus.

Perianthium gracile primo erectum postea aliquanto aperiens, ad imam basim constrictam induratum, tubum turbinatum circiter 0,7 mm longum, extus pilis minutis (0,2–0,6 mm) hirsutum formans. *Tepala* elongati-linearia, ecarinata, trinervia—nervis lateralibus superne indistinctis—, in lateribus integerrima, haud limbata, primo violacei- (vel purpurei-) rosea, deinde pallescentia; extus inaequaliter pilis niveis, breviter verticillati-articulatis sicut in bracteis, ad longioribus (ad 5 mm), stricti-erectis dein patentibus obsessa, inferne (supra tubum, circiter 1 mm) et superne (sub apicem, 1–2 mm) haud obsessa, inaequiformia: 2 extima (fig. 1D) ad 9: 3,3–0,6 mm longa lataque, in apice regulariter serrulati-denticulata, dente medio conspicue elongato, marginibus sub apicem non multum involutis, extus tantum pilis apicem haud aequantibus munita, intus glabra. 3 interioribus (fig. 1E) minora, 7–8 mm longa et 0,25–0,4 mm lata, apicem haud serrulatum versus visu acuminata, marginibus superne involutis, pilis dorsalibus apicem paulum excurrentibus, intus supra tubum pilis haud copiosis crispis et parce intricatis, remotius et indistincte modulosis, ad 2 mm longis, uno seu rarius ambobus lateribus tepali orientibus et partim introflexis obsessa.

* Botanische Staatssammlung München, Germany.

Unum tantum *stamen* fertile (fig. 1F, G), 4 *staminodia*; omnia basim versus gradatim vel rarius plus minusve abrupte ad 0,2–0,35 mm dilatata et coalita in cupulam membranaceam, glabram, integerrimam, circiter 0,8 mm altam, tubo perianthii adnatam, anulo libero minimo (0,1–0,13 mm); pseudostaminodia interiecta nulla. *Filamenta* glabra inferne vittata, superne subulati-filiformia, longitudine differentia (fig. 1G): fertile 2,1–2,3 mm, sterilia breviora 1,4–1,7 mm longa. *Antherae* flavae subrotundae (circiter 2:1,5 mm), basi bilobae.

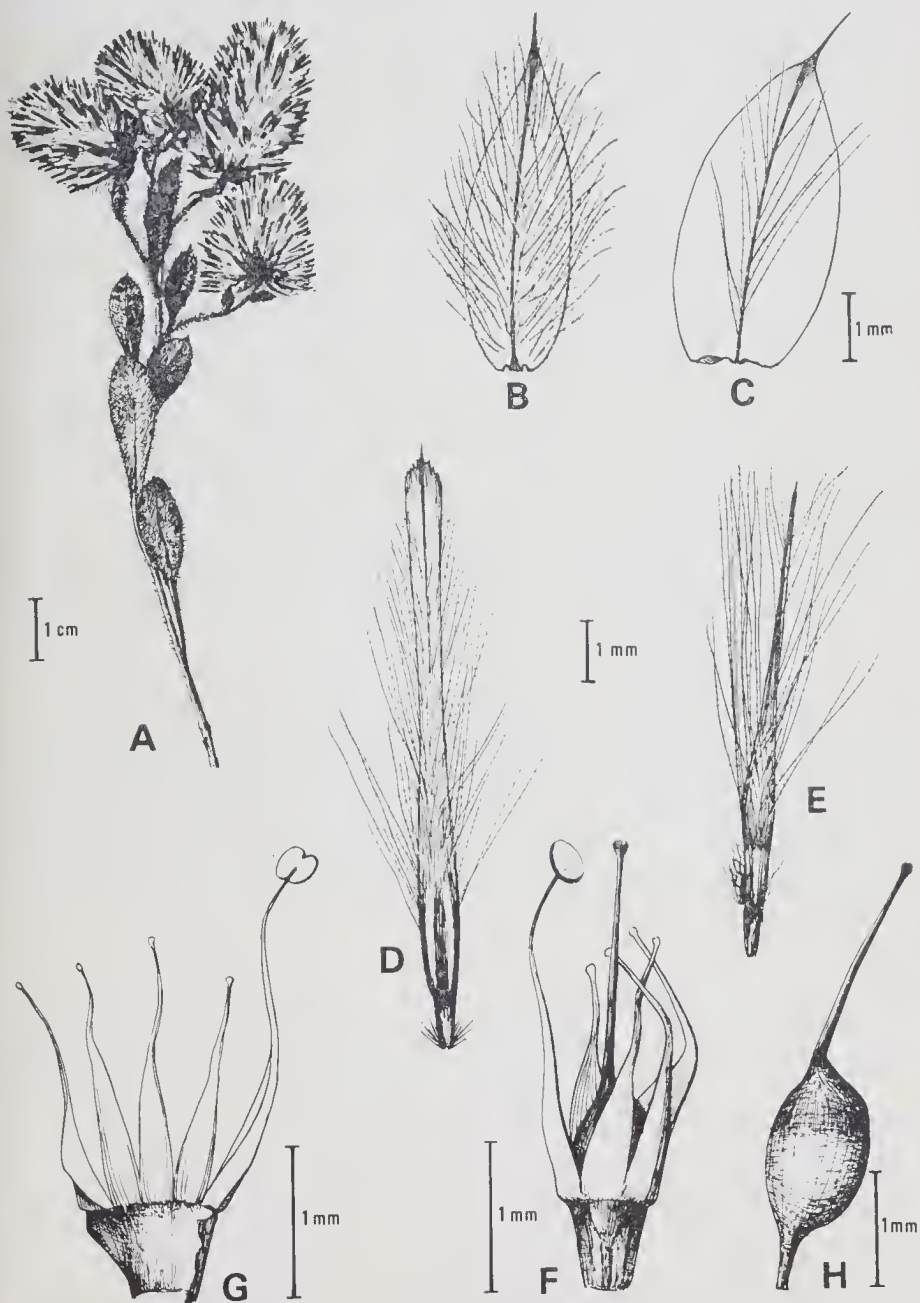


Figure 1—*Ptilotus alexandri* Benl. A—Terminal portion of plant (A. S. George no. 10152). B—Bract, outer face. C—Bracteole, outer face. D—Outer tepal, outer view. E—Inner tepal, inner view. F—Androecium and gynoecium. G—Staminal cup, opened. H—Pistil.

Ovarium subclavatum (fig. 1H) lateraliter plus minusve compressum, primo manifesto dein minus distincte stipitatum, ad 2 mm longum (stipite 0,4–0,5 mm longo incluso) et 0,8 mm latum. *Stylus* excentricus subrectus gracilis 1,7–2 mm longus, inferne 0,08 mm, superne 0,04 mm diametro, sicut ovarium glaberrimus. *Stigma* capitellatum papillosum.

Typification. Holotype of species: 6 miles north of Quobba Homestead, north of Carnarvon, W.A. (113° 24' E, 24° 19' S); *A. S. George* no. 10152, 3 Sept. 1970. ("Annual herb. Flowers deep pink. In sand, on *Triodia* steppe.")—PERTH

Isotypes: PERTH, AD, BM, CANB, K, M

Paratypes: near Notch Point, Dirk Hartog Island, W.A. (113° 10' E, 25° 57' S); *A. S. George* no. 11603, 7 Sept. 1972. ("Ephemeral herb; flowers pink.")—PERTH, M

Habitat. Apparently confined to sandy soils. Associated frequent species in type locality recorded by Mr. A. S. George (letter of 31.V.1973): *Triodia pungens*, *Acacia ligulata*, *Banksia ashbyi*, *Dampiera incana*, *Thryptomene baeckeacea*. "The vegetation was mostly less than 1 m high and very open."—On Dirk Hartog Island: "It appeared to be rare and was growing also on a sandy steppe. The associated dominant plants were *Plectrachne* sp., and *Acacia ligulata*" (A. S. George, 31.V.1973).

Material. The description is drawn up from the holotype, a sheet containing three complete plants, a big one branching at base with 8 stems carrying more than two dozen mature spikes, and two smaller ones with 8 developed inflorescences each. In addition five copiously flowering specimens have been made available which shall be treated as isotypes. Later the considerably scantier plants (3 samples with one, two and five spikes, respectively) from Mr. George's second discovery were sent to us for investigation through the courtesy of Mr. Robert D. Royce. Thus our studies were based on a total of 11 specimens.

Discussion

The depressed cushion-like habitat of the readily branched small plants forming patches (in the type locality only) points to a growth under rather dry conditions. Most *Ptilotus* taxa living in those sandy localities are perennials, real undershrubs or bush-like forms with stems woody at their base. Among the herbaceous species behaving as an annual just a few might be taken into consideration for a faint resemblance to our new western taxon, i.e. plants with erect main stems of a similar spreading habit, conspicuously hairy both in their vegetative parts and in outer floral organs (more or less woolly inside the inner tepals, too), and with pedunculate inflorescences of less than about 2.5 cm in diameter:

(a) *Pt. helipteroides* (F. v. Muell.) F. v. Muell. (W.A., S.A., N.T.) in its varieties *helipteroides* and *minor* (J. M. Black) Eichler ex Benl, shows (indistinctly) articulate hairs in stems and leaves as well as in perianth-segments, and a flower-colour like that of *alexandri* at anthesis; however the ovary is villous, the style central, and stems may sometimes reach a height of more than half a metre (in var. *helipteroides*), not forming cushions.

(b) *Pt. pseudohelipteroides* Benl (in *Muelleria* 1:105, 1959) known from Queensland only, exhibits some resemblance to the preceding species (var. *helipteroides*) in general appearance, except for flower-colour. Both taxa produce pseudostaminodia, in contrast to *Pt. alexandri*.

(c) *Pt. leucocoma* (Moq.) F. v. Muell. (S.A., Qld., N.S.W., N.T.) is usually slightly branched and rather slender, the scattered pubescence of the stem and leaves soon being restricted to leaf-axils and different in type from the floral indumentum: the articulate hairs being more or less crispy in vegetative parts, rigid (nodose or minutely denticulate-nodose) in tepals, as is the case in nos.

(a) and (b). None of the three taxa presents dendroid, i.e. distinctly verticillate hairs, anywhere. Furthermore their bracts are completely glabrous. They, therefore, do not approach our plant in question.

(d) *Pt. eichleranus* Benth (in Mitt. Bot. München 7:310, 1970) from South Australia, is of about the same height as the new taxon, and has distinctly verticillate hairs in the robust and often reddish-tinged vegetative parts, yet soon becoming glabrous. The spikes usually become broader, and the deeper brown-coloured bracts stand out against more shining pink flowers, especially in young inflorescences, the latter being markedly less crowded than in *alexandri* as a rule.

In many cases the inner tepals of *Ptilotus* flowers are not only smaller but look far more acute than the outer ones, mostly owing to the margins being tightly incurved towards the apex. But there are only a few species [e.g. *Pt. spathulatus* (R. Br.) Poiret] with such a striking and noteworthy difference between the perianth-segments as in the new form (fig. 1D, E).

As a matter of fact the 5-merous androecium in the genus shows a high degree of variation, not least with regard to the number of stamens often reduced to staminodes. From a total of nearly 80 species about 20 seem to have all their stamens fertile though not always equally shaped; others vary in number of staminodes from zero to one, zero to two, one to two, one to three, one to four, two to three, and three to four. There are only a few representatives with constantly two staminodes (e.g. *Pt. symonii* Benth), as far as we know; at least half a dozen species always produce two fertile stamens (e.g. *Pt. lazaridis* Benth). In *Pt. alexandri* merely one stamen was found fertile. The excellent and rich material comprising more than 130 spikes admitted a careful examination enabling us to state with convincing evidence the presence of four abortive stamens as a constant and significant feature, hitherto unobserved in any previously described taxon of the genus and very helpful for identification.

At first sight our novelty is readily distinguished by its distinctive appearance and vestiture. A closer examination reveals the peculiar morphologic difference between outer and inner tepals and the single fertile stamen unique in the genus. The new taxon, which differs most obviously from any other *Ptilotus*, thus requires special recognition.

Name. The specific epithet is bestowed in honour of Mr. Alexander S. George, the discoverer of this plant, in recognition of his contributions to the flora of Western Australia, both by collecting trips and by publications.

Taxonomic studies in *Thomasia* and *Lasiopetalum* (Sterculiaceae)

by Susan Paust*

Abstract

Four new species of *Thomasia* and six new species of *Lasiopetalum* are described; *Thomasia formosa* sp. nov., *T. gardneri* sp. nov., *T. microphylla* sp. nov., *T. tremandroides* sp. nov.; *Lasiopetalum cardiophyllum* sp. nov., *L. compactum* sp. nov., *L. glabratum* sp. nov., *L. lineare* sp. nov., *L. monticola* sp. nov. and *L. rotundifolium* sp. nov.

Two species of *Lasiopetalum* are reduced to synonymy: *L. angustifolium* W. V. Fitzg. is synonymous with *L. oppositifolium* F. Muell.; and *L. acutiflorum* Turcz. with *L. indutum* Steud.

All specimens cited are housed at PERTH, except where otherwise indicated.

Thomasia tremandroides S. Paust sp. nov. (Figures 1 and 11) (tremandroides = resembling some species of Tremandraceae)

Folia ovata, brevissime petiolata, 4–8 x 2.5–5 mm stellato-tomentosa. *Stipulae* foliaceae, 2.5 mm longae. *Racemus* pilis stellatis et simplicibus moniliformibus tomentosus. *Bracteolae* 3, anguste lineares, calycem subtus. *Calyx* 8 mm longus, stellato-hirsutus lobis 5 ovatis. *Petala* 5, spatulata, 1 mm longa. *Antherae* 5, fere sessiles, anguste triangulares, 3 mm longae. *Staminodia* 5, clavata, 1 mm longa. *Ovarium* 3-loculare, 1 mm longum pilis glandulosis et stellatis sparsim tomentosum. *Stylus* 2 mm longus, glaber.

Type: 33 mi N of Wubin towards Perenjori, Western Australia, 8 Oct. 1972, S. Paust 1319. *Holo*: PERTH; *iso*: CANB, K.

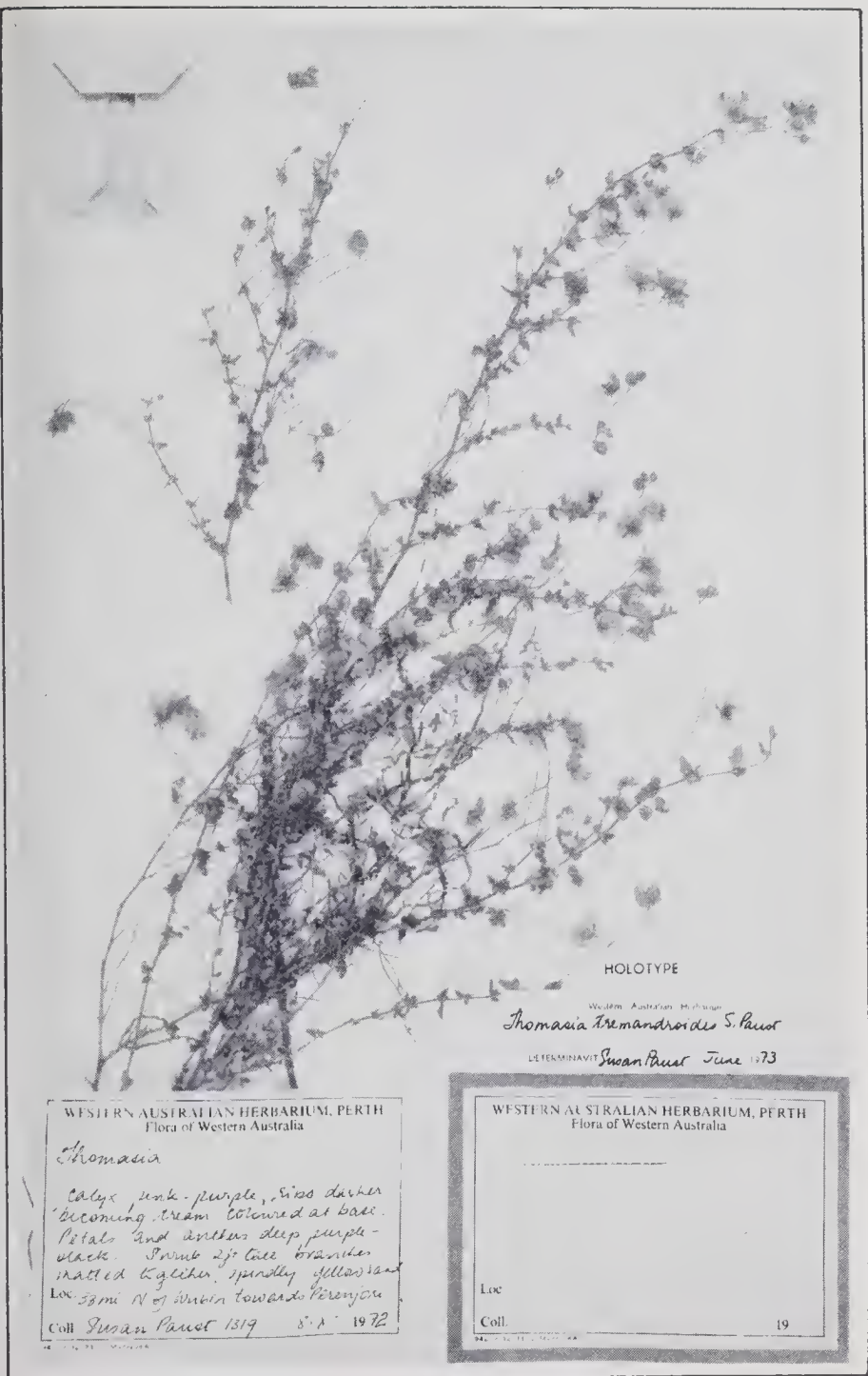
Erect, multistemmed, woody *perennial*, 10–60 cm high. *Branchlets* tomentose with stellate and simple-moniliform hairs. *Leaves* alternate; petiole minute; lamina ovate, chartaceous, 4–8 mm long, 2.5–5 mm wide, stellate-tomentose; margin undulate, slightly recurved. *Stipules* foliaceous, ovate-orbicular, often oblique, 2.5 mm long. *Racemes* leaf-opposed, 20–40 mm long, 1–4 flowered, indumentum similar to that of the branchlets; peduncle 10–30 mm long; pedicel 3–7 mm long; bracts linear, 2 mm long; bracteoles 3, narrow linear, 5 mm long, subtending calyx. *Calyx* angular in bud, mauve-pink, exduplicate and papery at anthesis, 8 mm long, stellate-hairy, divided to below the middle into 5 ovate lobes, ribs thickened especially at base. *Petals* 5, spatulate, 1 mm long, purple-black. *Anthers* 5, almost sessile, narrowly triangular, 3 mm long, purple-black. *Staminodes* 5, obscured by anthers, clavate, 1 mm long, alternate and basally connate with stamens. *Ovary* globose, 1 mm long, purple-black, with scattered simple, glandular and stellate hairs, 3-celled; style filiform, 2 mm long, glabrous, yellowish; ovules 3–4 per locule. *Seed* not seen.

Distribution: South-west Western Australia; from Bencubbin north to the Murchison River.

Murchison River, Oct. 1961, *de la Hunty*; Boolardy Station, *A. B. Cashmore* 128; Canna, *C. A. Gardner* 2691; near Morowa, *W. E. Blackall* 2817; 1 mi S of Caron, *S. Paust* 1309; 9.2 mi E of Bindi Bindi, *S. Paust* 1026; 6 mi S of Ballidu, *J. W. Green* 791; 13 mi N of Bencubbin, *W. E. Blackall* 3317; (?) Mt. Barker to Walpole, 31 Aug. 1965, *F. W. Humphreys*. (It is extremely doubtful that the collection data of the Humphreys specimen are correct.)

Thomasia tremandroides is distinguished from other species of *Thomasia* by its small papery ovate leaves and by the presence and morphology of its staminodes.

* Present address: Mrs. R. Downes, Cleator, Cumberland, England.



HOLOTYPE

Western Australian Herbarium

Thomasia tremandroides S. Paust

DETERMINED BY Susan Paust June 1973

WESTERN AUSTRALIAN HERBARIUM, PERTH
Flora of Western Australia

Thomasia

Calyx pink-purple, tips darker
becoming cream coloured at base.
Petals and anthers deep purple-
black. Spine 2½-3 cm. branches
matted together, spindly yellowish.

Loc. 53 mi N of Perth towards Kirenyou

Coll. Susan Paust 1319 S. A. 1972

WESTERN AUSTRALIAN HERBARIUM, PERTH
Flora of Western Australia

Loc.

Coll.

19

Figure 1—*Thomasia tremandroides* sp. nov. Holotype—S. Paust 1319.

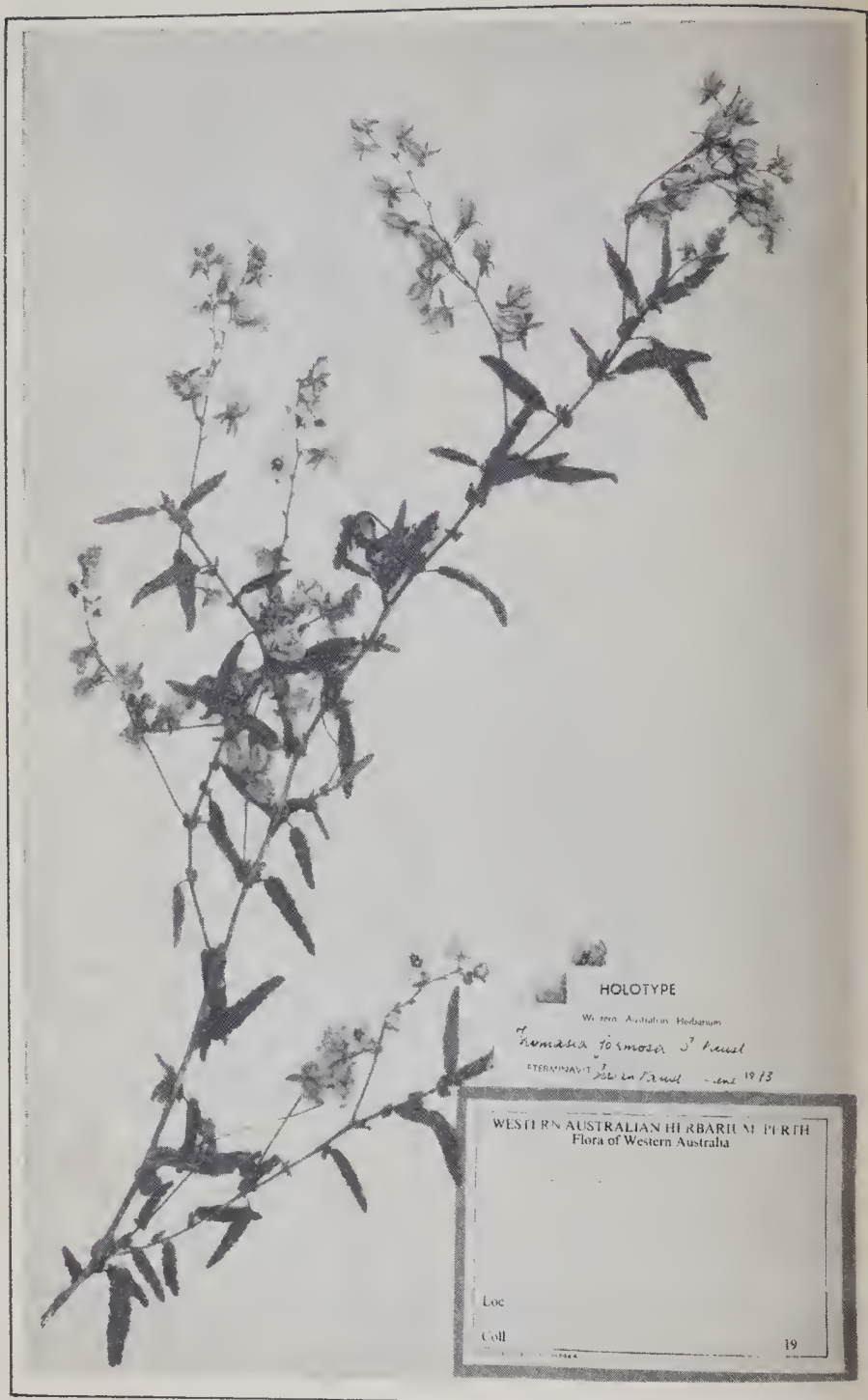


Figure 2—*Thomasia formosa* sp. nov. Holotype— $\pm$ 5 mi W of Three Springs, C. Chapman.

Thomasia formosa S. Paust sp. nov. (Figures 2 and 11)
(formosa = handsome)

Frutex stellato-tomentosus. *Folia* angustissime ovata, petiolata, 20–40 x 4–10 mm. *Stipulae* oblique ovatae, 4–7 mm longae. *Racemi* saepe ramosi. *Bracteolae* 3, lanceolatae, calycem subtus. *Calyx* 10 mm longus, stellato-hirsutus, lobis 5 ovatis. *Petala* 5, spathulata, 1 mm longa. *Stamina* 5, filamentis 1 mm longis, antheris anguste triangularibus 3·5 mm longis. *Ovarium* 3-loculare, 2 mm longum, albo-stellato-tomentosum. *Stylus* 3 mm longus, glaber.

Type: ± 5 mi W of Three Springs, Western Australia, 29 Sept. 1972. *C. Chapman* s.n. *Holo*: PERTH, iso: K.

Erect, multistemmed, woody *perennial*, up to 50 cm high; branchlets, leaves and inflorescence closely stellate-tomentose, rufous. *Leaves* alternate; petiole 5 mm long; lamina very narrowly ovate, 20–40 mm long, 4–10 mm wide, rugose above; margin ± crenulate, recurved. *Stipules* foliaceous, obliquely ovate, 4–7 mm long. *Racemes* leaf-opposed, 70–120 mm long, 7- many-flowered, often branched; peduncle 30–40 mm long; pedicels 10 mm long; bracts ovate 1–3 mm long; bracteoles 3, lanceolate, reflexed, 7 mm long, subtending calyx. *Calyx* pink, papery, 10 mm long, stellate-hairy, divided to below the middle into 5 ovate lobes, ribs thickened. *Petals* 5, spathulate, slightly concave, 1 mm long, glabrous. *Stamens* 5; filaments linear, 1 mm long; anthers narrowly triangular, 3·5 mm long. *Ovary* globose, 2 mm long, white stellate-tomentose, 3-celled; style filiform, 3 mm long, glabrous, ovules 4–8 per locule. *Seed* not seen.

Distribution: South-west Western Australia; this species is known only from collections made 8 km W of Three Springs.

Thomasia formosa is similar to the more southern species. *T. angustifolia* Steud. and *T. petalocalyx* F. Muell. in that it has a tomentose, 3-celled ovary and a glabrous style. It is distinguished from these species by the much larger flowers and inflorescence and by its leaf form.

Thomasia microphylla S. Paust. sp. nov. (Figures 3 and 11)
(micro = small, phyllum = leaf)

Frutex squamis ut videtur ciliatis lepidotus. *Folia* ovato-oblonga, breviter petiolata, 2–10 x 1·5–5 mm, coriacea, supra glabra, subtus lepidota. *Stipulae* nullae. *Racemi* 1–2-floribus. *Bracteolae* 3, teretes. *Calyx* 8 mm longus, varie-lepidotus, lobis 5 ovatis. *Petala* 5, ovata, carnosa, 0·8 mm longa. *Stamina* 5, filamentis 1 mm longis, antheris oblongo-linearibus, 3 mm longis. *Staminodia* ± 5, teretia, 1·5 mm longa. *Ovarium* 3-loculare, 2 mm longum, dense lepidotum. *Stylus* 3 mm longus, praeter basem glaber.

Type: Mt. Short, at N end of Ravensthorpe Range, Western Australia, 30 Aug. 1963, *A. S. George* 5698. *Holo*: PERTH, iso: CANB, K.

Erect, multistemmed, woody *perennial*, 15–35 cm high, branchlets, leaves and inflorescence variably lepidote with apparently ciliate scales. *Leaves* alternate, slightly reflexed; petiole 1–2 mm long, lepidote; lamina ovate-oblong, slightly cordate, 2–10 mm long, 1·5–5 mm wide, entire, coriaceous, smooth to reticulate and glabrous above, lepidote below. *Stipules* absent. *Racemes* terminal, 10–40 mm long, 1–2 flowered, peduncle 10–30 mm long; pedicels 4–5 mm long; bracts terete, 1–1·5 mm long, often absent; bracteoles 3, terete, 1–2 mm long, subtending calyx. *Calyx* angular in bud, pale mauve, 7–9 mm long, finely stellate-lepidote, the outer surface with additional large brown scales, particularly on the prominent ribs, divided almost to the base into 5 broadly ovate lobes. *Petals* 5, ovate, concave, fleshy, normally glabrous, 0·8 mm long. *Stamens* 5; filaments oblong, 1 mm long; anthers oblong-linear, 3 mm long, shortly attenuate and yellow at apex. *Staminodes* 5, alternate with stamens, terete, 1·5 mm long, often absent. *Ovary* ovoid, 2 mm long, densely lepidote, 3-celled; style filiform, 3 mm long, sparsely lepidote at base, otherwise glabrous; ovules 2–3 per locule. *Fruit* a loculicidal capsule; seed 1 per locule, almost cylindrical, villous, 2 mm long, 0·9 mm wide.



Figure 3—*Thomasia microphylla* sp. nov. Holotype—A. S. George 5698.

Distribution: South-west Western Australia; from Ongerup to east of Esperance.

10 mi E of Ongerup, *K. Newbey* 379; 22 mi S of Ravensthorpe, *E. Wittwer* 397; 18 mi E of Ravensthorpe, *K. Newbey* 1312; 40 mi E and 10 mi N of Esperance turn off, *F. Lullfitz* 3579.

Thomasia microphylla has affinities with *T. stelligera* (Turez.) Benth., but is readily distinguished from that species by its smaller, ovate-oblong leaves.

***Thomasia gardneri* S. Paust sp. nov. (Figures 4 and 11)**

(named after the late C. A. Gardner, the collector of the type specimen and former Government Botanist of Western Australia)

Frutex squamis ut videtur ciliatis lepidotus. *Folia* anguste-ovata, breviter petiolata, 8–20 x 4–8 mm, coriacea, supra glabra, subtus lepidota. *Stipulae* nullae. *Racemi* 1–2-floribus. *Bracteolae* 3, teretes. *Calyx* 9 mm longus, intus stellato-hirsutus, extus lepidotus, lobis 5 ovatis. *Petala* 5, spatulata, chartacea, 1·5 mm longa, marginibus sparsim lepidotis. *Stamina* 5, filamentis 2 mm longis, antheris oblongis, 2 mm longis. *Ovarium* 5-loculare, 3 mm longum, dense lepidotum. *Stylus* 5 mm longus, praeter basem glaber.

Type: Near Mt. Holland, Western Australia, Sept. 1929, *C. A. Gardner* s.n. Holo: PERTH.

Erect, multistemmed, woody *perennial*, up to 50 cm high; branchlets, leaves and inflorescence variably lepidote with apparently ciliate scales. *Leaves* alternate, slightly reflexed; petiole 2–4 mm long, lepidote; lamina narrowly ovate, 8–20 mm long, 4–8 mm wide, slightly cordate, entire, coriaceous, smooth to reticulate and glabrous above, lepidote below. *Stipules* absent. *Racemes* terminal, 10–30 mm long, 1–2 flowered; peduncle 5–15 mm long; pedicels slightly clavate, 5 mm long; bracts terete, often absent, 2 mm long; bracteoles 3, terete, 2 mm long, subtending calyx. *Calyx* prominently veined, pink, 9 mm long, sparsely stellate-hairy within, lepidote outside (especially on the ribs), divided almost to the base into 5 ovate lobes. *Petals* 5, spatulate, papery, 1·5 mm long, apical margin sparsely lepidote otherwise glabrous. *Stamens* 5, filaments oblong, 2 mm long; anthers oblong, 2 mm long. *Staminodes* absent. *Ovary* ovoid, 3 mm long, densely lepidote, 5-celled; style simple, 1·5 mm long, sparsely lepidote at base, otherwise glabrous; ovules 2 per locule. *Seed* not seen.

Distribution: South-west Western Australia; near Mt. Holland.

Thomasia gardneri is known only from the type and other collections from the same locality made by C. A. Gardner in September 1929. Its affinities lie with *T. microphylla* S. Paust (see above), but it is distinguished by its larger leaves, 5-celled ovary and differently-shaped petals and anthers.

***Lasiopetalum lineare* S. Paust. sp. nov. (Figures 5 and 12)**

(linearis = linear, referring to the leaves)

Folia anguste-linearia, brevissime petiolata, 20–40 x 1–4 mm, supra glabra, subtus stellato-tomentosa, marginibus revolutis. *Cymae* in capitula laxa contractae. *Bracteolae* filiformes. *Calyx* 7 mm longus, intus glaber, extus stellato-tomentosus, lobis 5, lineari-lanceolatis. *Petala* 5, orbicularia, 0·5 mm longa. *Antherae* fere sessiles, late-oblongae, 1·5 mm longae. *Ovarium* 3-loculare, 1 mm longum, albo-stellato-tomentosum. *Stylus* 3 mm longus pilis stellatis grandibus reflexis albis hirsutus.

Type: Watheroo West, Western Australia, 4 Nov. 1954, *R. D. Royce* 4965. Holo: PERTH, iso: K.

Erect, multistemmed, woody *perennial*, up to 40 cm high. *Branchlets* stellate-tomentose. *Leaves* alternate; petiole minute; lamina narrowly linear, 20–40 mm long, 1–4 mm wide, normally tightly revolute, almost glabrous above, stellate-tomentose below. *Cymes* leaf opposed, $\pm$ 8-flowered, closely stellate-tomentose, contracted into loose heads; peduncle 10–20 mm long; bracts filiform, 3 mm long; bracteoles normally 1, filiform, 4 mm long, subtending calyx. *Calyx* lilac (dark maroon near base of anthers), 7 mm long, almost glabrous within, white stellate tomentose outside, divided to the base into 5 linear-lanceolate lobes. *Petals* 5, orbicular, 0·5 mm long. *Anthers* 5, almost sessile,



Figure 4—*Thomasia gardneri* sp. nov. Holotype—Near Mt. Holland, C. A. Gardner.

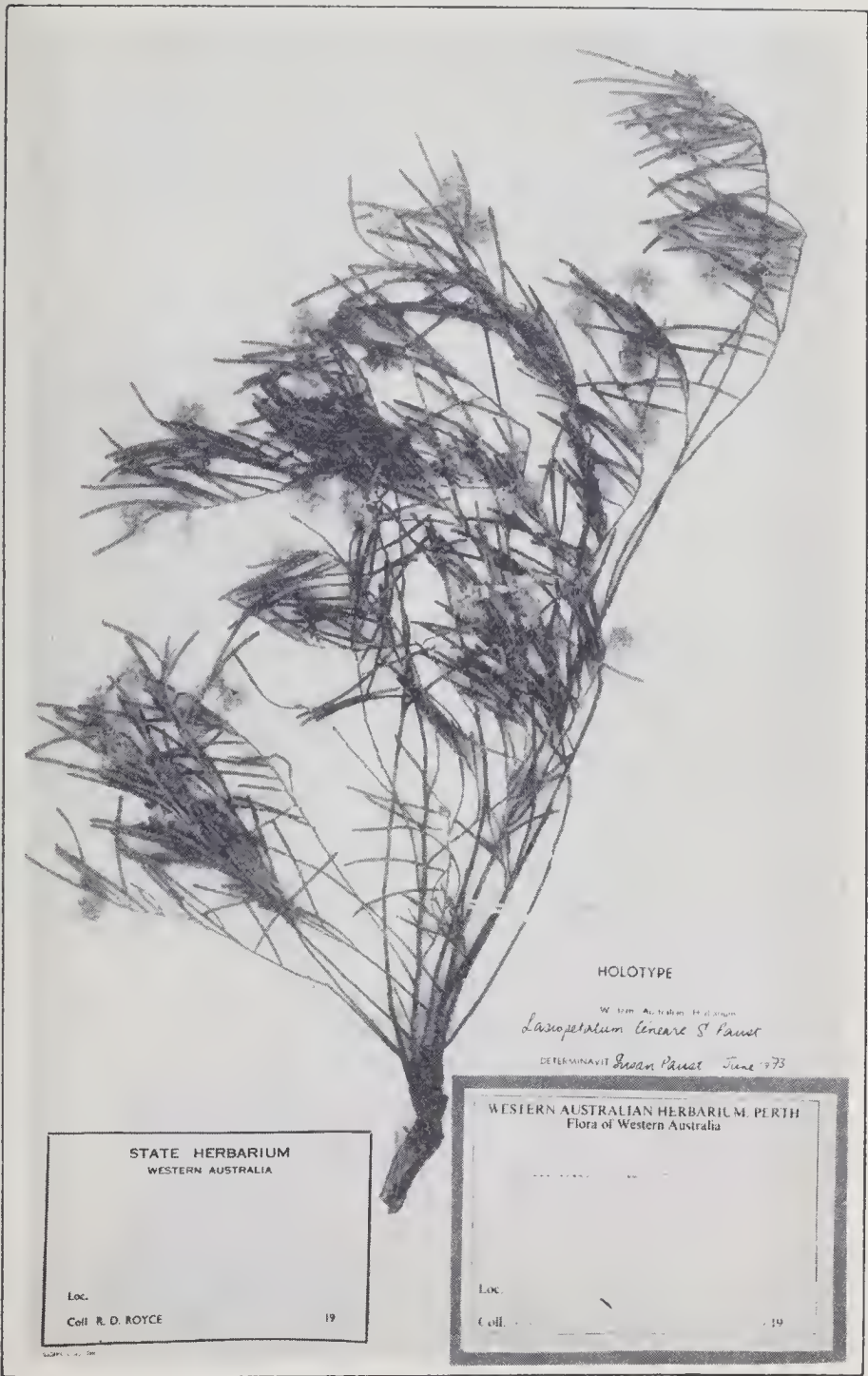


Figure 5—*Lasiopetalum lineare* sp. nov. Holotype—R. D. Royce 4965.

broadly oblong, 1.5 mm long. *Ovary* globose, 1 mm long, white stellate-tomentose, 3-celled; style filiform, 3 mm long, with large white reflexed stellate hairs; ovules 2 per locule. *Fruit* a loculicidal capsule; seeds 1 per locule, almost cylindrical, villous, 2.5 mm long, 1 mm wide.

Distribution: South-west Western Australia, from Eneabba south to Gingin.

Eneabba Creek, *C. A. Gardner* 9128; 26½ mi from Watheroo on road to Jurien Bay, *F. W. Humphreys* 183; 5 mi SSE of Yeal Swamp in Wanneroo Forestry Reserve, *Y. Chadwick* 2554.

Lasiopetalum lineare has floral characteristics similar to those of *L. drummondii* Benth., but is distinguished by having linear leaves.

***Lasiopetalum rotundifolium* S. Paust sp. nov. (Figures 6 and 12)**

(rotundus = almost circular, folium = leaf)

Folia rotunda, profunde cordata, petiolata, 7–35 x 9–30 mm, supra rugosa glabra, subtus arcte stellato-tomentosa. *Cymae* pilis stellatis et simplici-moniliformibus tomentosae. *Bracteolae* solitariae, ovatae, ab calycibus distantes. *Calyx* 6 mm longus, intus glaber, extus pilis stellatis et simplici-moniliformibus tomentosus, lobis 5, ovato-lanceolatis. *Petala* nulla. *Antherae* fere sessiles, late ovato-oblongae, 2 mm longae. *Ovarium* 3-loculare, 1.5 mm longum, albo-stellato-tomentosum. *Stylus* 2 mm longus pilis stellatis grandibus reflexis albis hirsutus.

Type: 5–6 mi S of New Norcia, Western Australia, 1 Oct. 1947, *C. A. Gardner* 8690. *Holo*: PERTH, *iso*: CANB, K.

Erect, woody *perennial*, up to 40 cm high. *Branchlets* tomentose with stellate and simple hairs. *Leaves* alternate; petiole 10–20 mm long, tomentose with stellate and simple-moniliform hairs; lamina orbicular, deeply cordate (the basal lobes sometimes imbricate), 7–35 mm long, 9–30 mm wide, rugose and glabrous above, closely grey stellate-tomentose below; margin ± crenulate slightly revolute. *Cymes* leaf-opposed, 20–40 mm long, ± 8-flowered, tomentose with stellate and simple-moniliform hairs; peduncle 10–20 mm long; bracts lanceolate, 3 mm long; bracteoles 1, ovate, 5 mm long, pink, papery, distant from calyx. *Calyx* pink (dark maroon near base of anthers), 6 mm long, almost glabrous within, tomentose with stellate and long simple-moniliform hairs outside, divided to near the base into 5 ovate lanceolate lobes. *Petals* absent. *Anthers* 5, almost-sessile, broadly ovate-oblong, dark maroon, 2 mm long. *Ovary* globose, 1.5 mm long, white stellate-tomentose, 3-celled; style simple, 2 mm long with large white reflexed stellate hairs; ovules 2 per locule. *Seed* not seen.

Distribution: South-west Western Australia; New Norcia area.

Swan River Colony, *J. Drummond* 119 (MEL 52366).

Lasiopetalum rotundifolium is known only from the Drummond and type collections. It has close affinities with *L. molle* Benth., but differs in having rounded, deeply cordate leaves.

***Lasiopetalum cardiophyllum* S. Paust. sp. nov. (Figures 7 and 12)**

(cardio = heart, phyllum = leaf)

Folia cordata, petiolata, 9–26 x 10–30 mm, coriacea, supra laevia glabra, subtus arcte stellata, tomentosa. *Cymae* pilis stellatis et simplici-moniliformibus tomentosae. *Bracteolae* solitariae, teretes, ab calycibus distantes. *Calyx* 8 mm longus, pilis stellatis et simplici-moniliformibus tomentosus, lobis 5, ovato-lanceolatis. *Petala* nulla. *Antherae* 5, fere sessiles, late ovato-oblongae, 1.5 mm longae. *Ovarium* 3-loculare, 1 mm longum, albo-stellato-tomentosum. *Stylus* 2.5 mm longus, pilis stellatis grandibus reflexis albis hirsutus.

Type: Mt. Saddleback, Darling Range, Western Australia, 13 Nov. 1904, *A. Morrison* s.n. *Holo*: PERTH.



HOLOTYPE

Lasiopetalum rotundifolium S. Gardner
 TERMINALIST Flowers Purple June 1873

STATE HERBARIUM. WESTERN AUSTRALIA.	
Loc. _____	19
Coll. C. A. GARDNER.	

WESTERN AUSTRALIAN HERBARIUM, PERTH Flora of Western Australia	
Loc. _____	19
Coll. _____	

Figure 6—*Lasiopetalum rotundifolium* sp. nov. Holotype—C. A. Gardner 8690.



Figure 7—*Lasiopetalum cardiophyllum* sp. nov. Holotype—Mt. Saddleback, A. Morrison.

Erect multistemmed, woody *perennial*, up to 40 cm high. *Branchlets* stellate-tomentose. *Leaves* alternate; petiole 4–15 mm long; lamina cordiform, 9–26 mm long, 10–30 mm wide, entire, coriaceous, smooth and almost glabrous above, closely grey stellate-tomentose below. *Cymes* leaf-opposed, 20–40 mm long, 5- many-flowered, sparsely tomentose with stellate and simple-moniliform hairs; peduncle 10–20 mm long; pedicels 10 mm long; bracts terete, 2 mm long, closely tomentose; bracteoles 1, terete, 2 mm long, closely tomentose, distant from calyx. *Calyx* pink (dark maroon near base of anthers), 8 mm long, tomentose with stellate and simple-moniliform hairs, divided to the base into 5 narrowly ovate-lanceolate acuminate lobes. *Petals* absent. *Anthers* 5, almost sessile, broadly ovate-oblong, 1.5 mm long, purple-black. *Ovary* globose, 1 mm long, white stellate-tomentose, 3-celled; style filiform, 2.5 mm long, with large white-reflexed stellate hairs; ovules 2 per locule. *Seed* not seen.

Distribution: South-west Western Australia: from North Bannister south to Mt. Saddleback.

Bunnings Plantation, 3 mi S of Halfway House on Albany Highway and 7 mi W of Highway, 21 Nov. 1969, *R. J. Edmiston*; towards Mt. Saddleback, between Williams and Hotham Rivers, 15 Nov. 1904, *A. Morrison* (K).

Lasiopetalum cardiophyllum has flowers similar to those of *L. floribundum* Benth. but is distinguished by having coriaceous, broadly ovate-cordate leaves which are stellate-tomentose below.

***Lasiopetalum glabratum* S. Paust. sp. nov. (Figures 8 and 12)**

(*glabratus* = glabrescent, referring to the leaves)

Folia late ovata ad semi-hastata vel cordata, petiolata, 10–30 x 6–30 mm, coriacea, fere glabra, supra reticulata, subtus manifeste nervata. *Cymae* pilis stellatis et simplici-moniliformibus tomentosae. *Bracteolae* solitariae, lineares, calyces subtus. *Calyx* 5 mm longus, sparsim stellato-tomentosus, extus etiam pilis simplici-moniliformibus, lobis 5, ovato-lanceolatis. *Petala* nulla. *Antherae* 5, fere sessiles, late ovato-oblongae, 1.5 mm longae. *Ovarium* 3-loculare, 1 mm longum, albo-stellato-tomentosum. *Stylus* 2.5 mm longus, pilis stellatis grandibus reflexis albis hirsutus.

Type: 2 mi N of turnoff to Mt. Cooke on Albany Highway, Western Australia, 6 Nov. 1971, *Susan Paust* 1068. *Holo*: PERTH.

Erect, multistemmed, woody *perennial*, up to 35 cm high. *Branchlets* stellate-tomentose. *Leaves* alternate; petiole stellate-tomentose, 3–6 mm long; lamina broadly ovate to semi-hastate, cordate, obtuse to acute, 10–30 mm long, 6–30 mm wide, coriaceous, undulate, almost glabrous, reticulate above, prominently veined below; margin semi-entire, slightly undulate and recurved. *Cyme* leaf-opposed, 30–50 mm long, 3–6-flowered, tomentose with stellate and simple-moniliform hairs; peduncle 20–30 mm long; pedicels 8 mm long; bracts linear, 2 mm long; bracteoles 1, linear, 2 mm long, subtending calyx. *Calyx* pink (dark maroon near base of anthers), 5 mm long, sparsely stellate-tomentose, the outer surface with additional simple-moniliform hairs, divided to the base into 5 ovate-lanceolate lobes. *Petals* absent. *Anthers* 5, almost sessile, broadly ovate-oblong, 1.5 mm long, purple-black. *Ovary* globose, 1 mm long, white stellate-tomentose, 3-celled; style filiform, 2.5 mm long, with large white reflexed stellate hairs; ovules 2 per locule. *Seed* not seen.

Distribution: South-west Western Australia: south-east of Perth, from Carmel east to York and south to Mt. Cooke.

Carmel, 29 Nov. 1928 *E. Dell*; 44 mi peg Albany Highway, *A. R. Fairall* 1711; between Perth and King George Sound, April, July 1854, *W. H. Harvey*; Swan River Colony, *J. Drummoid* 20 (K).

This species has floral similarities to *L. floribundum* Benth. and *L. cardiophyllum* S. Paust. (see above). It is distinguished from both in having coriaceous, undulate, almost glabrous leaves.

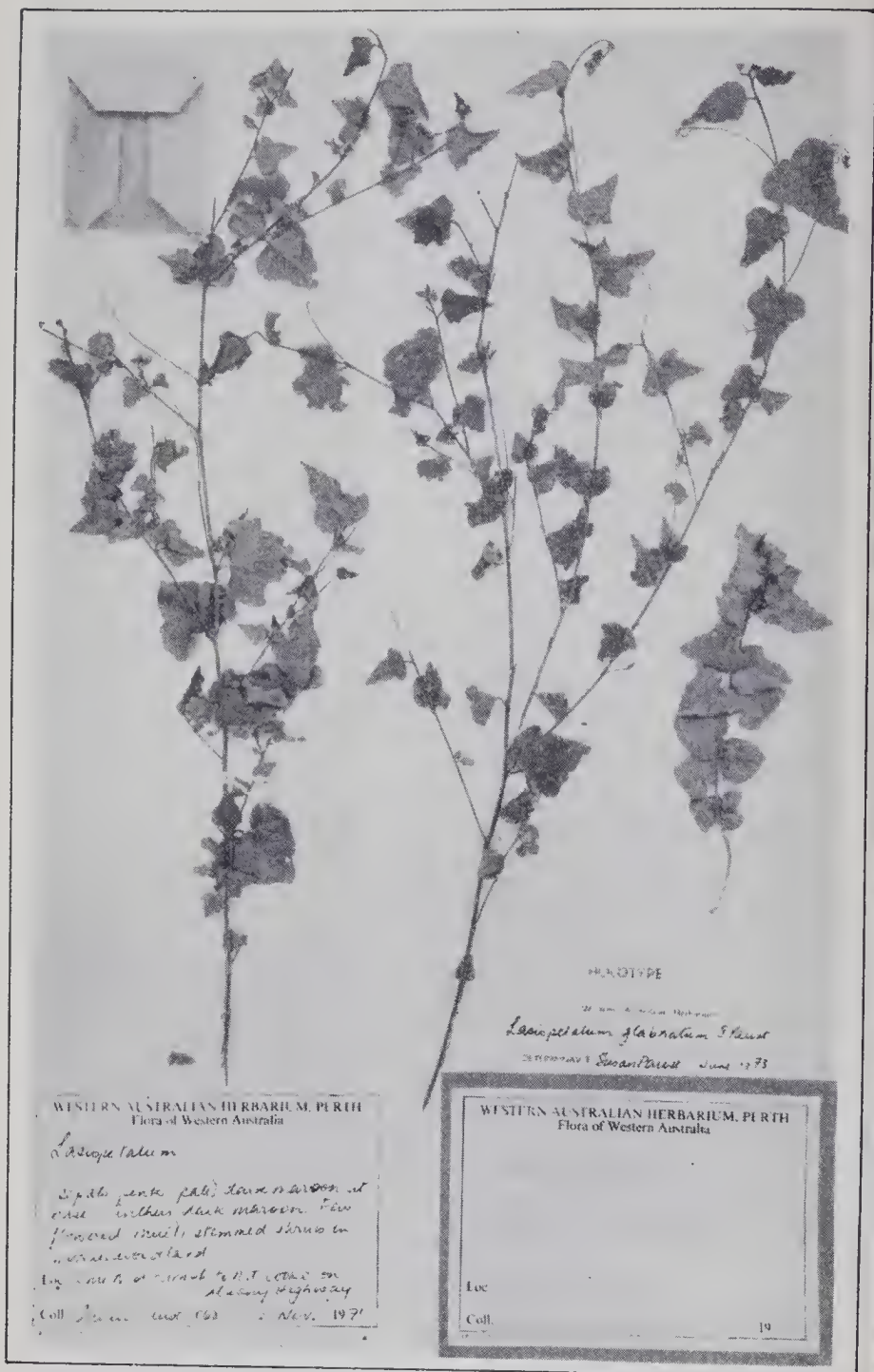


Figure 8—*Lasiopetalum glabratum* sp. nov. Holotype—S. Paust 1068.



HOLOTYPE

The State Herbarium, Western Australia

Lasiopetalum monticola S. Paul

DETERMINAVIT *Jacobs* 2nd June 1973

Lasiopetalum monticola S. Paul
 Comp. with *L. laevis* (L.f.) B. & P.
 and other leaves. This specimen more closely
 resembles *L. laevis* than *L. laetifolium* (L.f.) B.
 W. Paul
 July 1973

Determinavit

**STATE HERBARIUM,
 WESTERN AUSTRALIA**

Lasiopetalum monticola S. Paul

Loc. 2000 ft. near Peak 1
 Coll. 10. 10. 1973

**WESTERN AUSTRALIAN HERBARIUM, PERTH
 Flora of Western Australia**

Loc

Coll

19

Figure 9—*Lasiopetalum monticola* sp. nov. Holotype—Ellen Peak, A. Morrison.

Lasiopetalum monticola S. Paust. sp. nov. (Figures 9 and 12)

(*monticola* = a dweller on mountains)

Folia late ad anguste ovata, petiolata, 15–18 x 5–40 mm, supra laevia glabrescentia, subtus dense stellato-tomentosa. *Racemi* dense stellato-tomentosi. *Bracteolae* 3, filiformes, ab calyce distantes. *Calyx* 6 mm longus, intus sparsim stellato-hirsutus, extus dense albo-stellato-tomentosus, lobis 5, anguste ovatis. *Petala* 5, oblonga, 0·5 mm longa. *Antherae* 5, fere sessiles, anguste triangulares, 3 mm longae. *Ovarium* 3-loculare, 1 mm longum, papillatum. *Stylus* 2 mm longus, glaber.

Type: Ellen Peak, Stirling Range, Western Australia, 18 Oct. 1902, A. Morrison. *Holo*: PERTH, iso: CANB, K.

Erect, woody, *perennial* up to 50 cm high; branchlets, leaves and inflorescence densely stellate-tomentose, white to rufous. *Leaves* alternate; petiole 10–20 mm long; lamina broadly to narrowly ovate, entire, 15–80 mm long, 5–40 mm wide, smooth and becoming glabrous with impressed veins above, densely stellate-tomentose with prominent midrib below. *Raceme* leaf-opposed, 3–15-flowered, 40–110 mm long; peduncle 30–60 mm long; bracts terete, 5 mm long; bracteoles 3, filiform, 8 mm long, distant from calyx. *Calyx* 6 mm long, pink, sparsely white stellate-hairy within, densely white stellate-tomentose outside, divided almost to the base into 5 narrowly ovate lobes. *Petals* 5, oblong, concave, 0·5 mm long, glabrous. *Anthers* 5, almost sessile, narrowly triangular, 3 mm long. *Ovary* globose 1 mm long, papillate, 3-celled; style filiform, 2 mm long, glabrous, ovules 2 per locule. *Seed* not seen.

Distribution: South-west Western Australia; in the Stirling Range and on East Mt. Barren.

Stirling Range, E. Pritzel 701; Plantagenet Dist. Stirling Range, Diels 580; Mt. Warrungup, K. Newbey 1456; about half way along Salt River Road, Stirling Range, A. M. Ashby 1965; Eastern heights above Red Gum Springs, A. R. Fairall 465 and 471; 3 mi N of Ellen Peak, K. Newbey 315; East Mt. Barren, Sept. 1925. Gardner & Blackall; Gully, East Mt. Barren, Sept. 1924, A. Johnson.

Lasiopetalum monticola is similar in habit and appearance to *L. indutum* Steud. and *L. maxwellii* F. Muell., but is readily distinguished from these species by the papillate (rather than stellate-tomentose) ovary.

Lasiopetalum compactum S. Paust. sp. nov. (Figures 10 and 12)

(*compactus* = compact referring to the inflorescence)

Folia anguste oblonga, petiolata, 10–60 x 4–13 mm, coriacea, supra laevia glabra, subtus arcte stellato-tomentosa. *Cymae* in pseudo-capitula contractae. *Bracteolae* 3 lineares, calycem subtus. *Calyx* 5–8 mm longus, intus minute tuberculatus, extus dense albo-stellato-tomentosus, lobis 5, anguste ovatis acuminatis. *Petala* spathulata, 1 mm longa. *Stamina* 5, filamentis 1 mm longis. *antheris* anguste-triangularibus 2·5 mm longis. *Ovarium* 3-loculare, 2 mm longum, albo-stellato-tomentosum. *Stylus* 3 mm longus, glaber.

Type: 9 km SE of Ravensthorpe, Western Australia, 13 Aug. 1968, R. A. Saffrey 477. *Holo*: PERTH, iso: CANB, K.

Erect, woody, *perennial*, up to 1 m high. *Branchlets* closely stellate-tomentose, rufous to grey. *Leaves* alternate; petiole 5–7 mm long, closely stellate-tomentose; lamina narrowly oblong, entire, coriaceous, 10–60 mm long, 4–13 mm wide, smooth and glabrous with impressed midrib above, closely stellate-tomentose with prominent midrib below. *Cymes* leaf-opposed, 5–7-flowered, condensed into densely white stellate-tomentose heads; peduncle tomentose, 5–15 mm long; bracts linear, 5 mm long; bracteoles 3, linear, 7 mm long, subtending calyx. *Calyx* 5–8 mm long, pink and minutely tuberculate within, densely white stellate-tomentose outside, divided almost to the base into 5 narrowly ovate, acuminate lobes. *Petals* spathulate, slightly concave, 1 mm long glabrous. *Stamens* 5, filaments terete, 1 mm long; anthers narrowly triangular, 2·5 mm long. *Ovary* globose, 2 mm long, white stellate-tomentose, 3-celled; style filiform, 3 mm long, glabrous; ovules 2 per locule. *Fruit* a loculicidal capsule; seed 2 per locule, almost cylindrical, villous, 2 mm long, 1 mm wide.



HOLOTYPE

Western Australian Herbarium

Lasiopetalum compactum S. Paul

ULTERMINAVIT Susan Paul June 1973

WESTERN AUSTRALIAN HERBARIUM, PERTH
Flora of Western Australia

Loc.

Coll.

19

WESTERN AUSTRALIAN HERBARIUM, PERTH
Flora of Western Australia

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Figure 10—*Lasiopetalum compactum* sp. nov. Holotype—R. A. Saffrey 477.

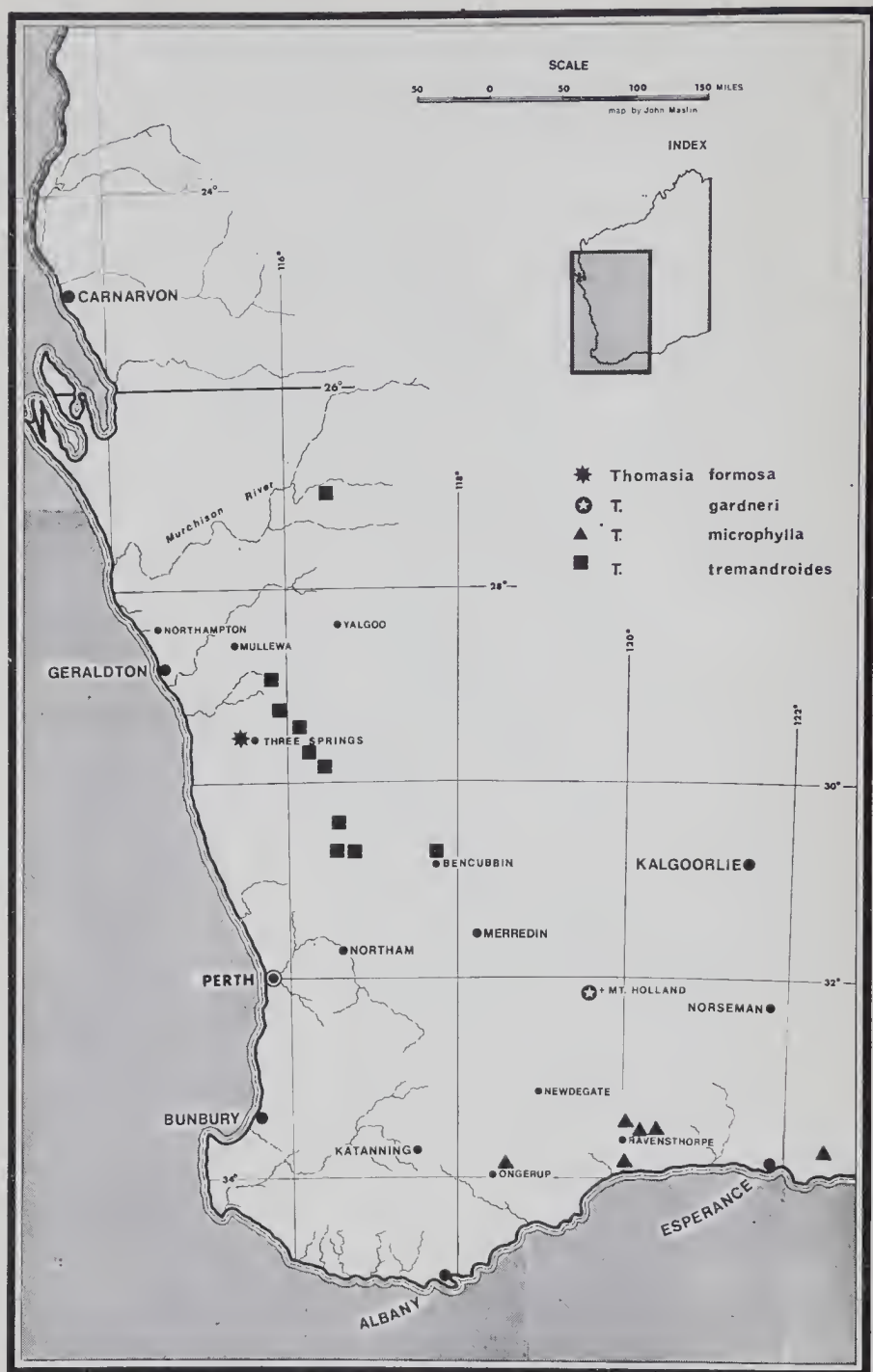


Figure 11—Distribution of *Thomasia formosa* sp. nov., *T. gardneri* sp. nov., *T. microphylla* sp. nov. and *T. tremandroides* sp. nov.

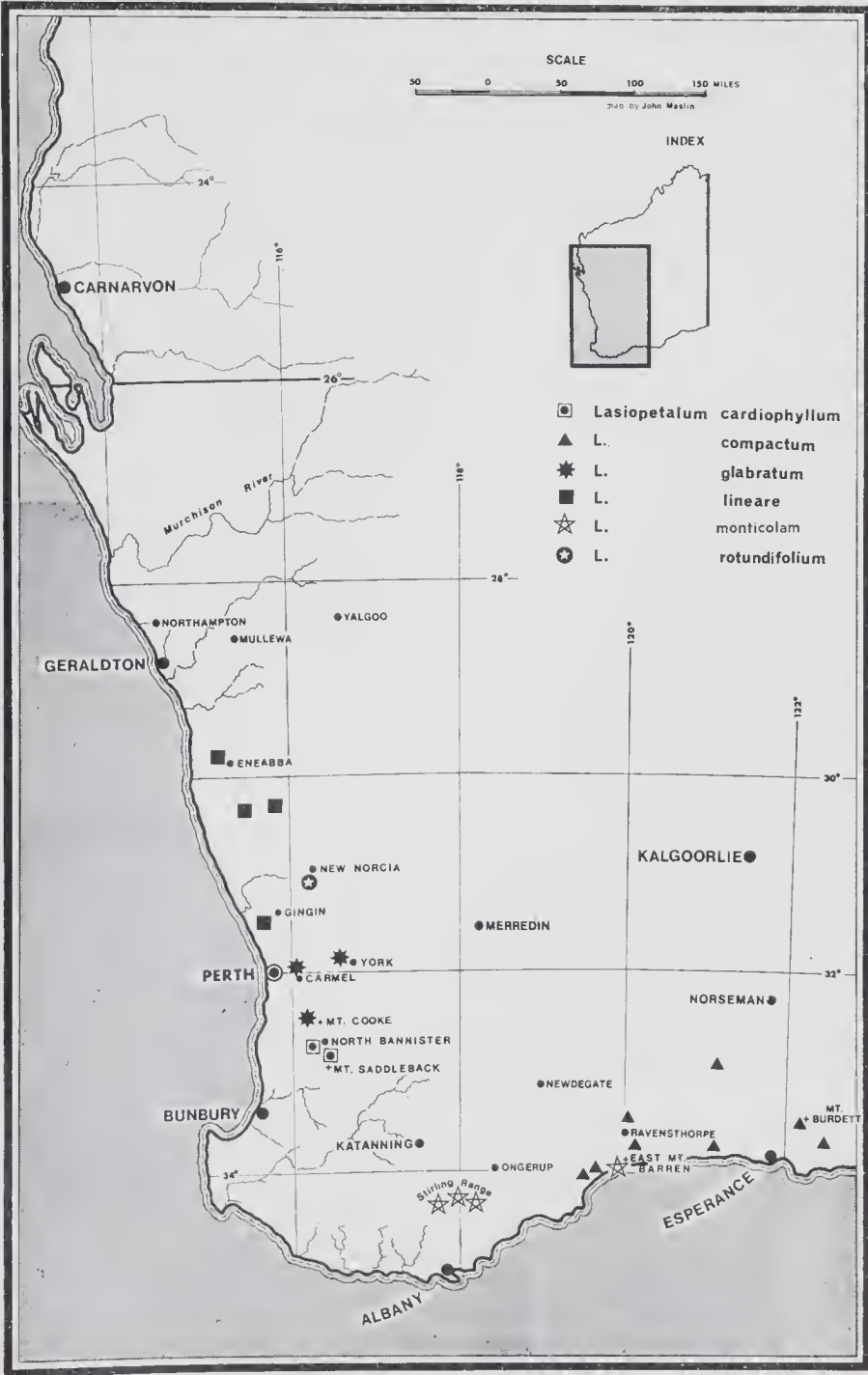


Figure 12—Distribution of *Lasiopetalum cardiophyllum* sp. nov., *L. compactum* sp. nov., *L. glabratum* sp. nov., *L. lineare* sp. nov., *L. monticola* sp. nov., and *L. rotundifolium* sp. nov.

Distribution: South-west Western Australia, from the Fitzgerald River east to Mt. Burdett.

Fitzgerald R. valley, *R. D. Royce* 8906; Mt. Short, Ravensthorpe Range, *E. M. Bennett* 2494; 6 mi E of Ravensthorpe, *K. Newbey* 958; Between Ravensthorpe and Hopetoun, *S. Paust* 759; Yerritup Creek, 13 km N of coast at Stokes Inlet, *A. E. Orchard* 1188; Peak Charles, *C. Davies* 89; Mt. Burdett, 50 km NNE of Esperance, *E. N. S. Jackson* 1319; Swan River Colony, *J. Drummond* 264 (also MEL 52342, L.H. specimen).

The floral characters of *L. compactum* and *L. indutum* Steud. are similar and have previously caused confusion. *L. compactum*, however, is readily distinguished from the racemose *L. indutum* by the compact cyme and larger leaves.

New Synonyms in *Lasiopetalum*

1. *Lasiopetalum oppositifolium* F. Muell., *Fragm.* 2:5 (1860).

Type: Murchison River, Western Australia, *Oldfield*. Holo: MEL 52371.

L. angustifolium W. V. Fitzg., *J. West Austral. Nat. Hist. Soc.* No. 1:3 (1904), *synon. nov.*

Type: Geraldton, Western Australia, Sept. 1903, *W. V. Fitzgerald*. Iso: PERTH.

Lasiopetalum angustifolium was described by W. V. Fitzgerald as differing from *L. oppositifolium* by the presence of white reflexed hairs on the style. The examination of type and other herbarium collections has shown that the hairiness of the style is extremely variable, while the specimens are similar in other characters. It is therefore considered that the two are synonymous.

2. *Lasiopetalum indutum* Steud. in *Lehmann, Pl. Preiss.* 1:235 (1845).

Type: *Preiss* 1655. Iso: MEL 52353-4.

L. acutiflorum Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 25:145 (1852), *synon. nov.*

Type: *J. Drummond* 254. Iso: MEL 52342, right hand specimen; MEL 52343; PERTH.

The two species are separated by Bentham in *Fl. Austral.* 1:259-260 (1863) by the degree of hairiness of the inside of the calyx lobes. From examination of the type and other herbarium collections, this character and leaf shape appear continuously variable. The two names are therefore considered synonymous.

Acknowledgement

Thanks are especially due to Mr. Alex George for the latin diagnoses.

A new species of *Anigozanthos* (Haemodoraceae) from Western Australia

By A. S. George

Abstract

Anigozanthos onycis sp. nov. is described. It is related to *A. humilis* Lindl. and *A. preissii* Endl.

Anigozanthos onycis A. S. George, sp. nov. (Fig. 1)

Herba rhizomate brevi foliis scapisque ephemeris. *Rhizoma* in solo 3–4 cm, bracteis (basibus foliorum) latis, glabris corvinis vestita; radices tenues, tenaces. *Folia infima* plures, bractei-formia, lineari-acuminata, 2–4 cm longa, glabra, in sicco scariosa, brunnea; *supera* linearia canaliculata, glabra, basibus albis vaginantibus. *Scapi* pauci, 15–30 cm alti, racemis 2, 4, 6 vel 8 ferentes, ubi plus quam 2 late-ramosi ut in *A. rufo* Labill. *Caulis* in solo glaber, supra etiam flores dense tomentoso-hirsutus pilis ramosissimis patulis rubris stramineisque. *Folia* caulina amplexicaulia, late-linearia sed in apices acutos angustata, canaliculata, glabra vel sparse tomentosa marginibus plerumque tomentosis; folia caulina infima 10–14 cm longa, supera breviora. *Racemi* 5–9-floribus stramineis, indumento ad basin pallido, supra rubro ut flos ruber videtur. *Pedicelli* sub-anthesi 2–5 mm longi, unusquisque ab bractea subulata tomentosa 2–5 cm longa subtentus. *Perianthium* 4·5–5 cm longum, ovarium tumidum 5–7 mm late includens. *Tubus perianthii* latere inferiore (antico) usque ad 1 cm ovarii fissus; *lobi* subulati, patulissimi, non recurvi, apicales (postici) recti, 8–12 , longi, laterales (antici) falcati, 10–19 mm long, omnes intus arcu stellato-tomentosi; perianthium intus cetera glabrum. *Stamina* ad basin loborum perianthii in costis inserta; anthera 3–4 mm longa appendicibus 2 apicalibus minutissimis. *Stylus* anthera breviter excedens, tenuis, glaber; stigma parva. *Ovarium* 3-loculares; ovula numerosa. *Fructus* non visus.

Type: South Stirling, southern Western Australia, 1 Oct. 1972, R. Dixon s.n. Holo: PERTH (Fig. 1), iso: CANB. Flowers in spirit collection at PERTH, no. 1260/B.

Herb with short rhizome, the leaves and scapes ephemeral. *Rhizome* 3–4 cm below ground level, covered with broad, glabrous blue-black bracts (leaf bases); roots thin, wiry. *Lowest leaves* several, bract-like, linear-acuminate, 2–4 cm long, glabrous, scarious when dry, brown; *upper leaves* linear, canaliculate, glabrous, the bases white and sheathing. *Scapes* few, 15–30 cm high, with 2, 4, 6 or 8 racemes, when more than 2 widely branched as in *A. rufus* Labill. *Stem* glabrous below ground, densely tomentose-hirsute above as well as the flowers, the hairs much-branched, spreading, red and cream. *Stem leaves* amplexicaul, broadly linear but tapering to acute apices, canaliculate, glabrous or sparsely tomentose, the margins usually tomentose; lowest stem leaves 10–14 cm long, upper ones shorter. *Racemes* of 5–9 flowers, pale green-cream, the indumentum pale at base, red above, giving the whole flower a red aspect, deeper on the upper side. *Pedicels* at anthesis 2–5 mm long, each subtended by a subulate, tomentose bract 1–3 cm long. *Perianth* 4·5–5 cm long including the swollen ovary which is 5–7 mm across. *Perianth tube* split on lower (anterior) side to within 1 cm of ovary; *lobes* subulate, very spreading, not recurved, apical (posterior) ones straight, 8–12 mm long, lateral (anterior) ones falcate, 10–19 mm long, closely stellate-tomentose within; the perianth otherwise glabrous within. *Stamens* inserted at base of perianth lobes on midribs; 4 upper anthers almost in line, the 2 lowest slightly below them; uppermost filaments 3–4 long, lowermost 6–8 mm; anthers 3–4 mm long with 2 very small apical appendages. Style shortly exceeding anthers, slender, glabrous; stigma small. Ovary 3-celled; ovules many per locule. *Fruit* not seen.

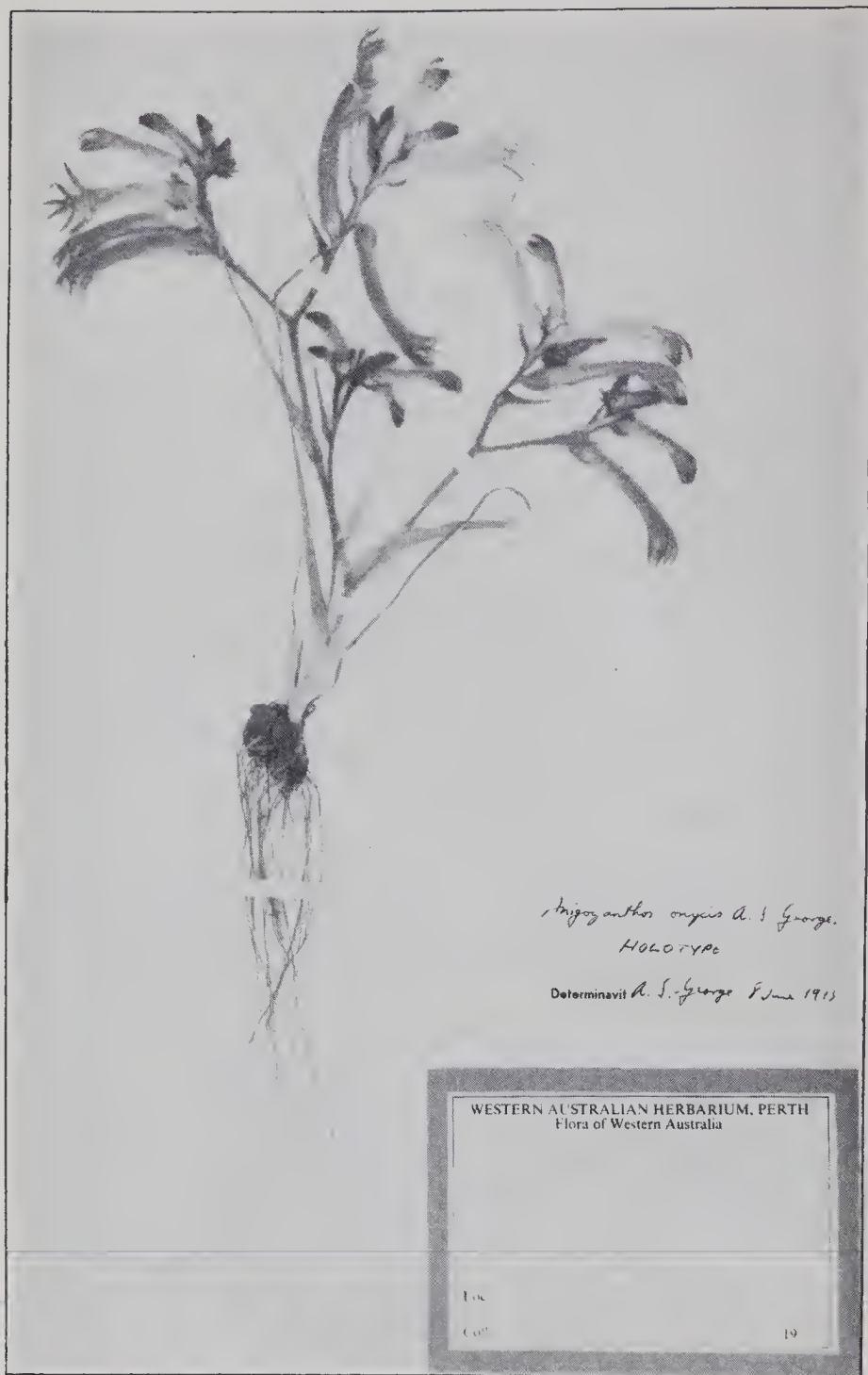


Figure 1—*Anigozanthos onycis* sp. nov. Holotype—South Stirling, R. Dixon (PERTH).

Distribution: Western Australia: South Stirling sandheaths, between the Stirling Range and the Green Range.

Albany district—received at A.I.M. Flower Show, Kalgoorlie, 19 Sept. 1962, *A. S. George* 4186 (PERTH); South Stirling, on property of W. T. Grocock, per *H. Venning*, 15 Sept. 1969 (PERTH).

The new species is allied to *Anigozanthos humilis* Lindl. and *A. preissii* Endl., both of which also have perennating rhizomes and ephemeral leaves and scapes. *A. humilis* usually has simple scapes (if branched then with one or two erect branches near the base) with racemes of up to 15 flowers; the perianth is 3–4·5 cm long with lobes 6–9 mm long, usually slightly recurved; the anthers are 2–3 mm long, unappendaged, on filaments 1·5–2·5 mm long, arranged in 3 pairs. It is widespread in sandy soils between the Murchison River and Albany, and east to Esperance. *A. preissii* has narrow-linear to sub-cylindrical leaves, and erect scapes 30–80 cm tall which are once forked just below the flowers. The perianth is 5–6·6 cm long, divided for over half its length, i.e. the tube 1–1·5 cm long above the oary; the lobes are 10–20 mm long and spreading; the anthers are 3–4 mm long with short prominent apical appendages, the upper filaments 5–6 mm long, the lower 10–12 mm long and arranged as in *A. onycis*. It is restricted to sandy woodlands and swamp margins within 50 km of Albany.

The specific epithet, derived from the Greek *onyx* (a claw, talon), refers to the claw-like appearance of the open flower.

Reference

GEERINCK, D. (1970)—Revision du genre *Anigozanthos* Labill. (Haemodoraceae d'Australie) in *Bull. Jard. Bot. Nat. Belg.* **40**, 3:261–276.

Seven new species of *Grevillea* (Proteaceae) from Western Australia

By A. S. George

Abstract

The following new species of *Grevillea* are described: *G. costata*, *G. fistulosa*, *G. infundibularis*, *G. involuerata*, *G. olivacea*, *G. ripicola*, and *G. seapigera*. All are endemic in South-Western Australia.

Introduction

The seven new species of *Grevillea* described here are endemic in South-Western Australia and are of restricted occurrence within this region.

The term "pollen presenter", referring to the style end of many Proteaceae, has been defined by Guthrie and Salter (1950) and later by Rourke (1969). Benthham (1871) realised that in Australian Proteaceae the pollen is shed onto the style end just before anthesis and is exposed upon it when the style is released from the perianth. He suggested that, as with the Asteraceae (Compositae), the stigmatic area becomes receptive later. Guthrie and Salter observed that the true stigmatic area is a small groove, usually at the apex of the pollen presenter. Rourke described and illustrated the whole structure in more detail.

The pollen presenter presents the pollen to the pollinator, and only later does the stigmatic groove become receptive to pollen from another source. The form of the pollen presenter is usually of some diagnostic value due to its variation of form between species and between genera. In *Grevillea* it has often been previously referred to as the stigmatic disc.

The specimens cited are at PERTH unless otherwise stated.

Grevillea costata C. A. Gardn. ex A. S. George sp. nov. Sect. *Lissostylis*

Grevilleae inconspicuae Diels affinis, a qua habitu patenti; foliis crassioribus pungentibus supra enerviis, pedicellis longioribus; et fructu costato, differt.

Type: Rocks in the Murchison River, W.A., 30 Aug. 1931, C. A. Gardner 2597. Holo: PERTH, iso: K, NSW.

Allied to *Grevillea inconspicua* Diels, from which it differs in the spreading habit; the thicker, pungent leaves, nerveless above; the longer pedicels; and the ribbed fruit.

A shrub to 1 m with spreading branches, silky-pubescent with appressed, medi-fixed hairs. *Branchlets* angular-striate when young, reddish. *Leaves* linear, pungent, very shortly petiolate, 1.5–4 cm long, margins closely revolute, the upper surface appressed-pubescent but at length glabrous. *Flowers* in small, terminal or axillary racemes, the peduncle 2–10 mm long, pubescent. *Bracts* filiform, ferruginous-pubescent, very early caducous. *Pedicels* slender, 6–10 mm long, sparsely appressed-pubescent. *Perianth* white, narrow, 3–4 mm long without the limb, appressed-pubescent outside, inside densely hirsute around the ovary, less so above; *limb* reflexed, pubescent outside, glabrous inside. *Torus* straight, gland small. *Style* 8–9 mm long; *stipe* 1–2 mm long; *pollen presenter* ± orbicular, thick but with a rather thin undulate margin, the stigmatic groove on a prominent central cone; a few glands on the style just below the pollen presenter. *Fruit* swollen, 12–15 mm long, prominently 7–10-ribbed, the ribs sometimes irregular. *Seeds* oblong, 9–10 mm long, thick, with incurved margins.

Distribution: Western Australia near lower central west coast; along or near the lower Murchison River, growing in rocky soil.

Other collections: 100 miles N of Rabbit Proof Fence, North-West Coastal Highway, 1 Aug. 1970, *E. H. West* s.n.; Ross Graham Lookout, Kalbarri National Park, 18 Dec. 1968, *H. Demarz* 922; 366 miles N of Perth, near the Murchison River, on North-West Coastal Highway, 10 Sept. 1965, *F. Humphreys* s.n.; Galena, at Murchison River bridge, 16 Sept. 1968, *M. E. Phillips* (duplicate of CBG 027704); Murchison River gorge, 13 May 1961, *A. S. George* 2377.

The specific epithet refers to the ribbed fruit.

***Grevillea fistulosa* A. S. George sp. nov. Section Plagiopoda**

Grevilleae drummondii Meisn. affinis, a qua indumento; foliis longioribus infra albotomentosis marginibus recurvis ad laxe revolutis; perianthii segmentis rufis 3-nervatis intus glabris; toro minus obliquo; stylo tereti hirsutiore; et stigmatibus orbiculari, differt.

Type: Middle Mt. Barren, Fitzgerald River National Park, W.A.; a shrub 3–6 ft, flowers red, 23 Sept. 1925, *C. A. Gardner* 1861 and *W. E. Blackall*. Holo: PERTH, iso: CANB, K, MEL, NSW.

Allied to *Grevillea drummondii* Meisn. from which it differs in the indumentum; the longer leaves, white-tomentose below, with recurved or loosely revolute margins; the perianth segments red, 3-nerved, glabrous inside; the torus less oblique; the style terete, more hirsute; and the orbicular stigma.

An erect shrub of 1–2 m with an *indumentum* of hairs which are forked at the base, the new growth densely ferruginous. *Branchlets* angular-striate, becoming terete, densely tomentose at first, at length almost glabrous. *Leaves* oblanceolate, obtuse but with a broad, hard muero, mostly 4–7 cm long, narrowed into a petiole of less than 5 mm; sometimes flat with recurved margins but usually the margins inrolled giving the leaf a hollow, tubular aspect; midrib prominent above and below, with a lateral nerve just inside each margin; upper surface hirsute at first but later glabrous and finely scabrous; lower surface remaining densely tomentose with matted hairs. *Flowers* in axillary, sub-umbellate racemes on very short peduncles, the rachis densely hirsute. *Bracts* linear, acute, 3–4 mm long, abaxial surface tomentose, adaxial surface glabrous within, soon eaducous. *Pedicels* 5–8 mm long, hirsute. *Perianth* 6–7 mm long, red, slightly swollen below middle, loosely hirsute, the limb globular, recurved, more densely hirsute, the segments 3-nerved, glabrous within. *Style* 6–7 mm long, thick, $\pm$ terete, hirsute, the torus oblique; *stipe* $\pm$ 1 mm long. *Pollen presenter* orbicular, lateral and vertical, shortly hirsute in the centre of the dorsal side, the stigmatic area a small cone just below the centre on the ventral side. *Fruit* fusiform, closely tomentose, 15–20 mm long. *Seed* elliptic but the margins tightly inrolled, very narrowly winged, 8 mm long, base acute.

Distribution: endemic in the Fitzgerald River National Park on the south coast of Western Australia. Usually occurs in dense scrub in rocky gullies on the hills.

Other Collections: Middle Mt. Barren, 16 July 1970, *A. S. George* 10093; west face of Thumb Peak, 23 Oct. 1970, *R. D. Royce* 9257; 3 km north of Thumb Peak, 27 Oct. 1967, *K. Newbey* 2720; Thumb Peak, 31 Oct. 1965, *A. S. George* 7119; Whoogarup Range, 28 Nov. 1931, *C. A. Gardner* 2967; NE side of Whoogarup Range, 2 Dec. 1960, *A. S. George* 1912; N of Hamersley River, 14 miles from Phillips River crossing, 28 Aug. 1965, *E. Wittwer* 433.

The specific epithet refers to the tube-like appearance of the leaves caused by the recurved margins.

***Grevillea infundibularis* A. S. George sp. nov. Sect. Leiogyne**

Grevilleae platypodae F. Muell. affinis, a qua habitu minori; foliis flabelliformibus, dentatus, fere sessilibus, glabris; et inflorescentiis parvis, simplicibus terminalibus, differt.

Type: West side of Middle Mt. Barren, Fitzgerald River National Park, W.A., among quartzite boulders, 16 July 1970, *A. S. George* s.n. Holo: PERTH, iso: AD, CANB, K, MEL, NSW, PERTH.

Allied to *Grevillea platypoda* F. Muell., from which it differs in the smaller habit; the leaves flabelliform, dentate, almost sessile, glabrous; and the small, simple, terminal inflorescences.

A sprawling shrub, occasionally up to 1 m tall, appressed-pubescent when young, becoming glabrous apart from the flowers, or the branches sometimes spreading-hirsute. *Leaves* hemispherical-flabelliform, almost sessile, when fresh concave and stem-clasping so as to appear funnel-like, mostly 10–25 mm long x 20–35 mm wide, dentate with mucronate teeth, a prominent nerve to each tooth, the nerve-like margins slightly recurved. *Flowers* red, in small terminal racemes, rarely axillary. *Rachis and pedicels* appressed-pubescent with medifixed hairs; pedicels 5–8 mm long. *Perianth* 7–9 mm long without limb, broad at base, sparsely pubescent outside, inside densely hirsute below, less so above; limb prominent, recurved, pubescent outside, glabrous inside. *Torus* straight, gland $\pm$ horizontal, lobed, rather thin. *Style* 17–18 mm long, slender, glabrous; stipe 1 mm long; ovary bilobed; *pollen presenter* lateral and vertical, orbicular, the stigmatic groove small, central. *Fruit* broadly fusiform but abruptly narrowed at each end, 13–14 mm long, thick-walled, somewhat rugose, with a ridge on each side. *Seeds* not seen.

Distribution: known so far from only two peaks in the Fitzgerald River National Park on the south coast of Western Australia. Growing with scrub among quartzite boulders.

Other Collections: Thumb Peak, 27 Oct. 1967, K. Newbey 2727; W slope of Thumb Peak, near base, 23 Oct. 1970, R. D. Royce 9274.

The specific epithet refers to the funnel-like aspect of the leaves in the fresh state.

Grevillea involucrata A. S. George sp. nov. Sect. *Plagiopoda*

Grevilleae fulgentis C. A. Gardn. affinis, a qua foliis brevioribus pinnatisectis 5–13-lobatis; inflorescentia pauciflora; involucre persistenti; bracteis fere vel sat glabris; pedicellis glabris; perianthio extus glabri, intus dimidio infero dense hirsuto; et stylo graciliori minus hirsuto, differt.

Type: Between Hyden and Lake Varley, W.A. (32°41'S, 118°56'E), 30 June 1970, A. S. George 9890. Holo: PERTH, iso: AD, CANB, K, MEL, NSW, PERTH. In spirit collection at PERTH, no. 1300/A.

Allied to *Grevillea fulgens* C. A. Gardn. from which it differs in the shorter pinnatisect leaves with 5–13 lobes; the few-flowered inflorescence; the persistent involucre; the bracts almost or quite glabrous; the glabrous pedicels; the perianth glabrous outside, densely hirsute inside in the lower half; and the more slender, less hirsute style.

A spreading shrub to 50 cm tall x 2 m broad. *Branches* pubescent with both appressed medifixed hairs and short erect glandular hairs. *Leaves* pinnatisect, 1–3 cm long, divided almost to the midrib into 5–13 linear pungent lobes 4–8 mm long, appressed-pubescent but becoming glabrous, the margins tightly revolute but the midrib prominent below. *Inflorescence* terminal or axillary, of 1–3 flowers, the short peduncles with several bracts forming a persistent involucre. *Bracts* cuneate-ovate, acute, 4–8 mm long (those subtending the flowers the larger), glabrous or with a few appressed hairs outside below the apex, deep pink. *Pedicels* slender but thickened under the torus, 6–10 mm long, glabrous. *Perianth* 10–12 mm long without the limb, broad at base, thick, glabrous outside hirsute inside in the lower half, the limb tightly revolute, glabrous. *Torus* oblique, gland widely concave. *Style* $\pm$ 2 cm long, curved; stipe 1–2 cm long, glabrous anteriorly, hirsute posteriorly; ovary densely white-hirsute; style ferruginous-hirsute with basifixed hairs; *pollen presenter* lateral and vertical, orbicular, thick, the stigmatic groove central, scarcely raised. *Fruit* not seen.

Distribution: known from two localities in southern South-Western Australia, between Hyden and Lake Magenta, where it grows in shallow sand over laterite on open heath.

Other collection: $\pm$ 6 miles NW of Lake Magenta, 7 July 1971, K. Newbey 3388.

The specific epithet refers to the involucre of bracts about the inflorescence.

Grevillea olivacea* A. S. George sp. nov. Sect. *Leigyne

Grevilleae obtusifoliae Meisn. affinis, a qua habitu elatiori erecti; foliis majoribus subtus albo-pubescentibus; rhachidi pedicellisque dense pubescentibus; et perianthio extus pubescenti intus glabri praeter pilos densos circiter ovarium, differt.

Type: on the mainland opposite Snag Island, S of Dongara, W.A.; shrub to 2.3 m with red flowers, on low limestone flat, 6 Sept. 1966, S. Chambers 88. Holo: PERTH.

Allied to *Grevillea obtusifolia* Meisn. from which it differs in the taller, erect habit; the larger leaves white-pubescent below; the rachis and pedicels densely pubescent; and the perianth pubescent outside and glabrous inside except for a ring of hairs about the ovary.

A shrub to 4 m, the branches appressed-pubescent becoming glabrous. Leaves narrow-elliptic to oblanceolate, rarely with 1 or 2 small lobes near apex, 3–5 cm long, obtuse, narrowed into a petiole up to 1 cm long, the margins recurved to loosely revolute, upper surface green, appressed-pubescent at first but soon glabrous, lower surface appressed-white-pubescent; midrib evident on both sides with faint penninervation. Flowers red in short terminal and axillary racemes, the rachis and pedicels densely pubescent. Pedicels 4–5 mm long. Perianth 7–8 mm long (excluding limb), pubescent outside, glabrous inside except for a ring of dense hairs around the ovary, the limb erect in young bud, recurved before anthesis, densely pubescent outside, glabrous inside. Torus straight, gland prominent. Style 25 mm long, slender, glabrous, the stipe 4–5 mm long; pollen presenter oblique, orbicular, with a prominent stigmatic cone. Fruit $\pm$ cylindrical but pouched at base, stipe lateral, apex abruptly tapered into persistent style, 11–13 mm long, glabrous, somewhat rugose. Seeds elliptic but supervolute, 8 mm long, the margins narrowly winged.

Distribution: Western Australia, near west coast between Dongara and Jurien Bay: growing in calcareous soil among scrub.

Other collections: 15 miles N of Snag Island, 21 Sept. 1966, S. Chambers 119; Logue River, 26 Aug. 1948, C. A. Gardner 9104 (PERTH, CANB, K, NSW); Stockyard Gully, July 1963, C. A. Gardner s.n.; Stockyard Gully, June 1963, Gabrielson s.n. (PERTH, MEL); Eneabba Reserve, 10 miles NE of Leaman, 2 Aug. 1967, A. C. Kessell 631 (PERTH, AD); Jurien Bay area, Sept. 1957, no coll.

The specific epithet refers to the leaf colour which resembles that of olive leaves (*Olea europaea* L.).

Grevillea ripicola* A. S. George sp. nov. Sect. *Calothyrsus

Grevilleae dielsianae C. A. Gardn. affinis, a qua foliorum lobis lineari-lanceolatis planis; perianthii segmentis intus fauce pilis reflexis pubescentibus etiam marginibus breviter, differt.

Type: Collie River at Collie, W.A.; growing in gravelly loam along river banks; 15 Oct. 1965, A. S. George 6848. Holo: PERTH, iso: AD, CANB, K, MEL, NSW, PERTH.

Allied to *Grevillea dielsiana* C. A. Gardn., from which it differs in the lobes of the leaves linear-lanceolate, flat; and the perianth segments pubescent in the throat with reflexed hairs and shortly pubescent on the margins.

A densely branched shrub to 3 m tall, young growth pubescent, otherwise glabrous apart from the bracts and the inner surface of the perianth. Leaves divided divaricately into 3–5 linear-lanceolate lobes, the lower ones again divided into 2–5 lobes, all 3-nerved, pungent, flat with slightly recurved margins;

the whole leaf up to 6 cm long x 8 cm broad, the lobes 1–3 cm long. *Flowers* pink becoming red, with green limb and pollen presenter, in terminal racemes on short peduncles. *Bracts* ovate about 0·5 mm long, pubescent in the upper part and on the margins, very early caducous. *Pedicels* reflexed, 4–5 mm long. *Perianth* 8–10 mm long, slightly broader in lower half, the limb reflexed; glabrous outside, inside pubescent in the throat with reflexed hairs and on the margins with shorter, spreading hairs. *Torus* somewhat oblique; *gland* thick. *Style* 30–35 mm long, slender; *stipe* 3 mm long; *pollen presenter* lateral, very oblique, $\pm$ orbicular, the stigmatic area a small central umbo. *Fruit* 16–18 mm long, smooth, style persistent. *Seeds* oblong, slightly crescentic, grooved on inner face.

Distribution: South-Western Australia: around Collie, 160 km S of Perth. Grows along river banks in jarrah-marri forest.

Other collections: Griffin Bridge, Collie, 27 Nov. 1965, A. R. Fairall 1820 (PERTH, NSW); 4 miles SE of Collie on road to Cardiff, 20 April 1966, A. S. George 7710; Collie, Oct. 1969, P. N. Shedley s.n.

The specific epithet refers to the habitat, i.e. growing on river banks.

Grevillea scapigera A. S. George sp. nov. Sect. *Lissostylis*

Grevilleae eryngioidi Benth. affinis a qua habitu effuso; foliis minoribus bipinnatifidis longe-petiolaribus lobis angustioribus; inflorescentia simplici pedunculo breviori glabra praeter perianthii pagina interiori hirsuta; bracteis parvis; stylo longiori longe-stipitato; et fructu seminibusque angustioribus, differt.

Type: Between Corrigin and Quairading, W.A., on sandplain, 14 Feb. 1960, C. V. Malcolm s.n. *Holo*: PERTH, iso; NSW.

Allied to *Grevillea eryngioides* Benth., from which it differs in the sprawling habit; the smaller, bipinnatifid leaves with narrower lobes, long-petiolate; the simple inflorescence on a shorter peduncle glabrous except for the hirsute inner surface of the perianth; the small bracts; the longer style, long-stipitate; and the narrower fruit and seeds.

A shrub, the stems prostrate or slightly ascending, appressed-pubescent. *Leaves* erect, 3–9 cm long on, slender petioles, bipinnatifid, at first pubescent but soon glabrous; lobes cuneate to lanceolate, flat, pungent. *Flowers* in dense racemes on leaf-opposed erect peduncles to 30 cm high, simple or rarely branched. *Rachis* glabrous. *Bracts* linear, 3·5–4·5 mm long, ciliate, caducous. *Pedicels* slender, 3–5 mm long, glabrous. *Perianth* pale yellow, narrow, 4–5 mm long, revolute under the limb, glabrous except for spreading hairs inside in the lower half. *Torus* straight. *Style* about 18 mm long, slender, minutely papillose; *stipe* 4–5 mm long; *pollen presenter* lateral, vertical, obovate with thin undulate margins, the stigmatic groove central, slightly raised. *Fruit* 1–1·5 cm long, tuberculate. *Seeds* navicular, smooth, outer surface convex, inner slightly so, with narrow membranous borders.

Distribution: Western Australia: central South-West, between Brookton and Hyden, growing on sandplains.

Other collections: Sandplain W of Jubuk, 6 Nov. 1954, N. H. Brittan s.n.; Bendering-Corrigin area, 20 Oct. 1971, N. O'Donnell S1778; Hyden area, 23 Nov. 1970, N. O'Donnell S1334.

The specific epithet refers to the form of the inflorescence.

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The genus *Cenchrus* (Poaceae) in Australia

By A. S. Weston

Abstract

A key to the species of *Cenchrus* in Australia is presented. Comments are made on the synonymy and distribution of the species keyed, particularly with reference to Western Australia. *Cenchrus biflorus* is recorded for the first time in Western Australia.

Introduction

Cenchrus is one of many genera of grasses in Australia that are troublesome both pragmatically and theoretically. The importance of the members of *Cenchrus* as weeds is indicated by statements made by Burbidge (1970), Gardner (1952), Maiden (1898) and Willis (1962) and by the frequency with which plants of this genus are submitted to the herbaria for identification. Of the nine species found in Australia two have been introduced for erosion control (Willis, 1962) and forage (Gardner, 1952), at least two, both American in origin, are important weeds and only two are native. Yet Bentham (1878) lists three species of *Cenchrus*, all presumably indigenous, if not endemic, to Australia. One of the three was actually an early adventive from America; it and another species were incorrectly named by Bentham.

Now, almost one hundred years later, the confusion concerning the naming and delimiting of *Cenchrus* is still evident; half of the names used by Gardner (1952) are misapplied or otherwise incorrect, Eichler (1965) expresses uncertainty as to which of two names is the correct one to apply to a species found in South Australia and the adventive plants in Victoria that Willis (1962) calls *Cenchrus pauciflorus* Benth. would probably fit within the limits set by DeLisle (1963) for *Cenchrus longispinus* (Hack.) Fern. Twentyman's discussions (1972) and descriptions of *Cenchrus incertus* M. A. Curtis and *C. longispinus* are a beginning to the resolution of this confusion. As a further step this paper presents a key to the species of *Cenchrus* known by the author to occur in Australia and includes a species whose name has been misapplied here, *Cenchrus tribuloides* L. Although the key is intended primarily for use in Western Australia it should be useful anywhere on the continent. It is based upon DeLisle's treatment (1963) of the genus and an examination of all specimens of *Cenchrus* in the Western Australian Herbarium. These include representatives of all species known to occur in Australia, with the exception of *Cenchrus caliculatus* Cav. *Cenchrus* specimens in the State Herbarium of South Australia were also examined. The key is followed by an alphabetical listing of the keyed species with comments on their synonymy and distribution.

Key to the *Cenchrus* species found in Australia

- A. Spines connate for more than 1/3 of the distance above the base, forming a more or less globose burr or involucre, which encloses 1 or more spikelets; spines or bristles retrorsely barbed or scabrid.
- B. Burr consisting of 1 whorl of united, flattened spines subtended by at least 1 whorl of smaller and finer bristles.
 - C. Burrs closely crowded in the inflorescence; spines often interlocking; outer bristles equal to or slightly exceeding the inner spines; peduncle ca. 2 mm wide; burrs never, though spines sometimes slightly, purple **C. brownii**
 - CC. Burrs loosely spaced in the inflorescence; outer bristles mostly ca. 1/2 the length of inner spines; peduncle more than 2 mm wide; burrs often purple **C. echinatus**

- BB. Burr consisting of several whorls of flattened spines emerging at irregular intervals throughout the body of the burr and with no row of smaller and finer bristles at the base.
 - C. Spines slender (though often subulate), usually more than 50; burrs short to medium pubescent; 2-4 spikelets per burr; florets 5.8-7.6 mm long
C. longispinus
 - CC. Spines broader at the base, less than 45.
 - D. Burrs glabrous to short pubescent; 2-4 spikelets per burr; florets 3.4-5.8 mm long
C. incertus
 - DD. Burrs densely pubescent; 1 spikelet per burr; florets 6.8-8.7 mm long
C. tribuloides
- AA. Spines connate to 1/3 of the distance above the base, forming a small disc or shallow cup.
 - B. Spines retrorsely barbed.
 - C. Spines grooved externally, long ciliate on inner margins
C. biflorus
 - CC. Spines terete, densely pubescent below, often 1 spine prolonged beyond the others
C. caliculatus
 - BB. Spines antrorsely barbed.
 - C. Spines prolonged beyond the burr none, glabrous or subglabrous, 2-4 mm long
C. setigerus
 - CC. Spine(s) prolonged beyond the burr into distinct, slender, scabrid bristle(s).
 - D. Bristles at base of burr 6-10; long bristle 1; knob at base of burr; peduncle glabrous
C. elymoides
 - DD. Bristles at base of burr at least 20; peduncle ciliate to short pubescent
C. ciliaris

***Cenchrus biflorus* Roxb. (Figure 1C)**

Cenchrus biflorus Roxb., Fl. Ind. 1:238 (1820).

Cenchrus echinatus Benth. in Hook., Niger Fl. 564 (1849).

Cenchrus biflorus is a weed of warm temperate to tropical areas. DeLisle (1963) gives its distribution as Africa, Madagascar, Arabia and India, but Hitchcock (1951) reports the introduction of *C. biflorus* into the United States in ballast and wool waste. The method of its introduction into Australia is unknown as is its distribution outside of Western Australia. The oldest specimen of this species in the W.A. Herbarium was collected in 1933 at Broome, the possible initial point of introduction. Since 1950 it has been collected several times, always in the Fitzroy District of the Northern Botanical Province, where it has been misidentified as *C. pauciflorus* and *C. echinatus*. Its habitat preferences are probably similar to those of *C. echinatus*, with which it has been collected.

***Cenchrus brownii* Roem. et Schult. (Figure 1D)**

Cenchrus brownii Roem. et Schult., Syst. Veg. 2:258 (1817)—Based upon *C. inflexus* R. Br.

Cenchrus inflexus R. Br., Prodr. Fl. Nov. Holl. 1:195 (1810), non Poir. (1804).

The material upon which Robert Brown based his description of this species was collected by him in Arnhem Bay, northern Australia, in 1803 (Brown, unpublished; Flinders, 1814), and as recently as 1878 (Bentham, 1878) the species was believed to be indigenous to Australia. In fact, it is native to tropical America and was probably the first alien *Cenchrus* and possibly the first American weed to become established in Australia. It is conceivable that it was unintentionally introduced as early as 1606, by Torres, who sailed from Peru west through the strait named after him but no later than 1793, when Brampton and Alt made the last passage through the Torres Strait prior to the voyage of Flinders' ship, "The Investigator", in 1803 (see Flinders, 1814). The only Western Australian specimen in the W.A. Herbarium was collected in Cottesloe, apparently cultivated. It is in the Darwin and Gulf District of the Northern Territory (Chippendale, 1971) and can be expected in coastal areas of adjoining districts in Queensland and Western Australia.

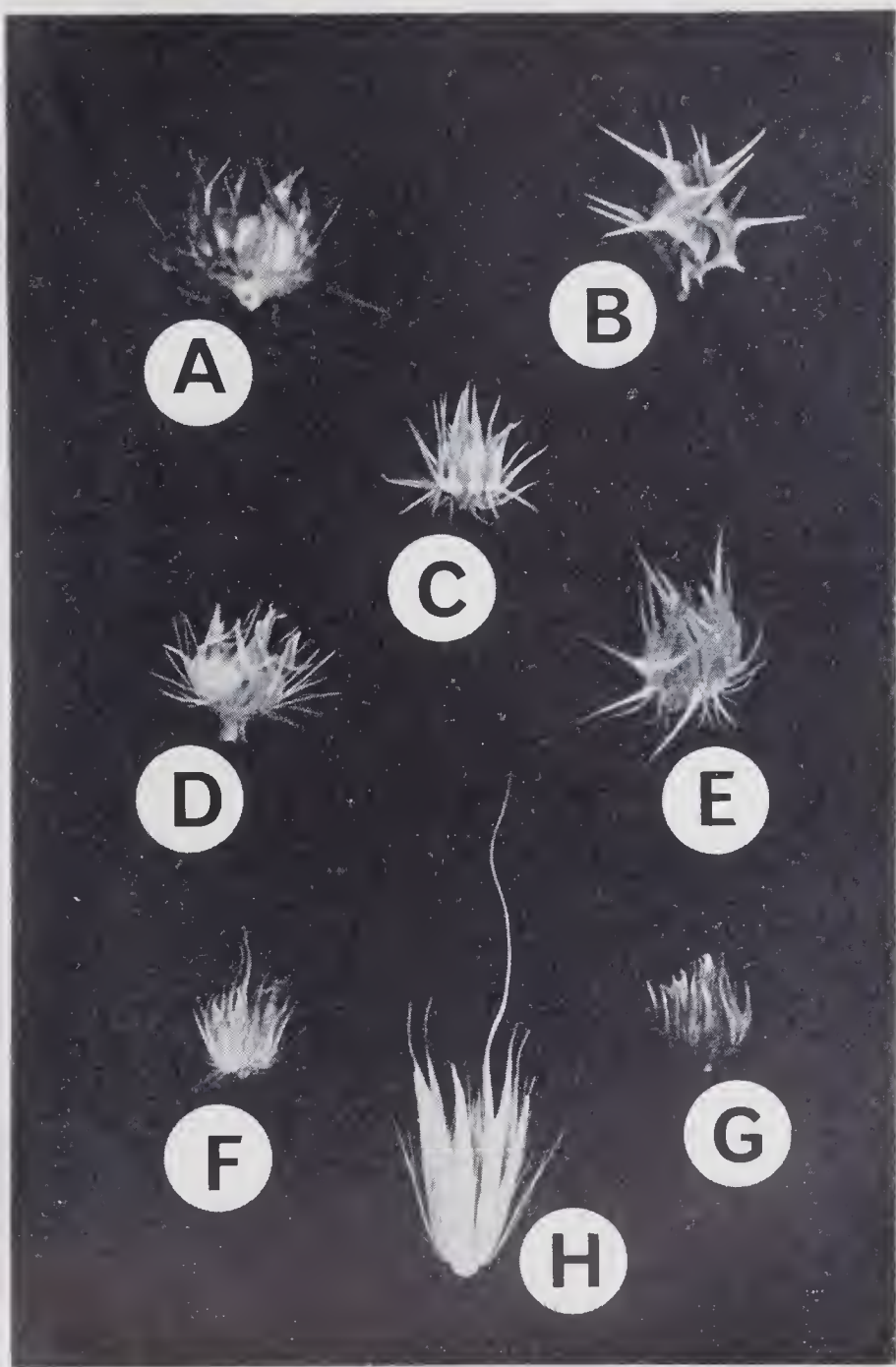


Figure 1—Burs of: A—*C. echinatus*. B—*C. incertus*. C—*C. biflorus*. D—*C. brownii*. E—*C. longispinus*. F—*C. ciliaris*. G—*C. setigerus*. H—*C. elymoides*.

***Cenchrus caliculatus* Cav.**

Cenchrus caliculatus Cav., Icones 5:40 t.463 (1799).

Cenchrus australis R. Br., Prod. Fl. Nov. Holl. 1:196 (1810).

Cenchrus anomoplexis Labill., Sert. Austr.-Caled. 14 t.19 (1824).

Cenchrus caliculatus is variously known as "Spiny Burr Grass" (Beadle, et al., 1972), "Large Burr Grass", "Scrub Burr Grass" and "Hillside Burr Grass" (Maiden, 1898). Its long, clinging burrs make it an unpleasant weed of roadsides and pastures, especially on the moist, poorer soils of hillsides. It has a natural distribution that includes islands of the South Pacific, New South Wales and Queensland. Contrary to DeLisle (1963), the species is not recorded from the Northern Territory, nor are any of the specimens he examined from there.

***Cenchrus ciliaris* L. (Figure 1F)**

Cenchrus ciliaris L., Mant. 302 (1771).

Pennisetum cenchrroides Rich. ex Pers., Syn. Pl. 1:72 (1805).

Cenchrus pennisetiformis Hochst. et Steud. ex Steud., Nom. ed. II. 1:317 (1840).

The highly variable *Cenchrus ciliaris*, "Buffel Grass", inhabits dry, sandy areas throughout much of Africa and northern India. Esteemed as a fodder and forage grass, it was introduced in the Port Hedland area with camel fodder from India (Gardner, 1952). The earliest W.A. collections were made in Port Hedland in 1922. Since then its range has been widely extended north east to the Ord River and south east to Kalgoorlie. It is present in all the districts of the Northern Territory (Chippendale, 1971), is adventive on Clifton Hills Station, South Australia (Black, 1943) and probably is common in inland areas of New South Wales and Queensland. It has become established in the Ouyen District of Victoria, where it was introduced by the Soil Conservation Authority to control erosion (Willis, 1962). Gardner (1952) maintained *Cenchrus pennisetiformis* as being doubtfully distinct from *C. ciliaris*, but DeLisle (1963) considered the two names to be synonymous and his treatment is followed here.

***Cenchrus echinatus* L. (Figure 1A)**

Cenchrus echinatus L., Sp. Pl. 1050 (1753).

Native to warm temperate to tropical America, this species is now a pest in New South Wales, Queensland, the Northern Territory and Western Australia. In W.A. it has been reported from the tropics and as far south as Wagin. The earliest collection in the W.A. Herbarium was made in 1931 at Shark Bay, the only location given for this weed by Gardner (1952), and in 1933 it was collected at Broome. It may have become established in W.A. well before then and be much more common and widespread than is indicated by the number and provenances of the specimens in the herbarium. Unfortunately, weeds, especially ones with spines, are too frequently eschewed by collectors.

***Cenchrus elymoides* F. Muell. (Figure 1H)**

Cenchrus elymoides F. Muell., Fragn. 8:107 (1873).

Pennisetum elymoides (F. Muell.) C. A. Gardn., Fl. W.Austral. 276 (1952).

C. elymoides is the only species of *Cenchrus* endemic to Australia. It occurs only in the far north: north of Townsville in Queensland, the Darwin and Gulf and the Victoria River Districts in the Northern Territory (Chippendale, 1971) and the Ord District of the Northern Botanical Province in Western Australia. It is reputedly useful as a fodder (Bailey, 1909). On the basis of what he described as "perfectly free bristles", Gardner (1952) transferred *Cenchrus elymoides* to *Pennisetum*. However, because the inner series of "bristles" (spines) is connate in the lower part and because the outer bristles are not entirely free but arise from a swollen knob at the base of the spikelet

the species is better left in *Cenchrus*. Like *C. caliculatus*, *C. elymoides* is distinguished from the alien species in Australia by the long, solitary bristle extending beyond the spines.

***Cenchrus incertus* M. A. Curtis (Figure 1B)**

Cenchrus incertus M. A. Curtis, Boston Soc. Nat. Hist. J. 1:135 (1837).

Cenchrus pauciflorus Benth., Bot. Voy. H.M.S. Sulphur 56 (1884).

With *C. echinatus*, this species is the most nearly cosmopolitan weed in the genus. Like *C. echinatus* it is native in warm temperate to tropical America and has become well established in Australia, primarily in New South Wales and Queensland. The only Western Australian specimens of *C. incertus* were collected in the Darling District of the South western Botanical Province, but the species can be expected in other parts of the state. The first record of this species in Australia is from north eastern New South Wales in 1921 (see Twentyman, 1963), but it was collected near Bunbury, Western Australia only six years later. Although *Cenchrus pauciflorus* is here included in *C. incertus* neither of the specimens upon which Gardner (1952) based his inclusion of the former species in his Flora of Western Australia can be placed in the latter species. One was a misidentified specimen of *C. biflorus*, and the other belongs to *C. longispinus*.

***Cenchrus longispinus* (Hack.) Fern. (Figure 1E)**

Cenchrus longispinus (Hack.) Fern., Rhodora 45:388 (1943).

Cenchrus echinatus L. forma *longispina* Hackel in Kneucker, Allg. Bot. Zeitschr. 9:169 (1903).

Cenchrus pauciflorus Benth. var. *longispinus* (Hack.) Jansen et Wachter, Nederl. Kruidk. Archief 56:246 (1949).

Indigenous to the central and eastern United States, *C. longispinus* is the most temperate species in the genus. It is the only one recorded by DeLisle (1963) for cold temperate continental Canada and, at Boscabel (near Kojonup), is the most southerly occurring *Cenchrus* in Western Australia. To date it is recorded from W.A. only in the Avon and Stirling Districts of the South-western Botanical Province, but in the eastern states its range extends north of Brisbane and includes New South Wales, Victoria and South Australia. The first Australian collection of this species was in 1895, from south central Victoria (Twentyman, 1972). The earliest W.A. collection of *C. longispinus* was from South Caroling in 1924.

***Cenchrus setigerus* Vahl. (Figure 1G)**

Cenchrus setigerus Vahl., Enum. Pl. 2:395 (1806).

Cenchrus ciliaris L. var. *setigerus* (Vahl.) Maire et Weiller in Maire, Fl. Afr. du N. 1:342 (1952).

Cenchrus setigerus was in Western Australia by 1929 and now occurs from the Ord River, in the north east, to at least as far south as Carnarvon. Its native range and origin are similar to those of *C. ciliaris* and, like that species, it is a good fodder grass. *C. setigerus* was introduced into north western Australia from India under the name of "Birdwood Grass" (Gardner, 1952). *C. setigerus* and *C. ciliaris* are both apomictic (see DeLisle, 1963), a character advantageous to such colonizing species.

***Cenchrus tribuloides* L.**

Cenchrus tribuloides L., Sp. Pl. 1050 (1753).

Known as the "Dune Sandburr" in the United States, *C. tribuloides* is restricted to sandy coastal areas of the eastern United States south of New York

and to a few isolated localities to as far south as Brazil. Generally the Australian plants identified as *C. tribuloides* are *C. longispinus* although some might be *C. incertus* (including *C. pauciflorus*) (see Twentyman, 1963). What Black (1943) reports as appearing at Renmark about 1910 is probably *C. longispinus*.

Acknowledgement

The loan of specimens by HJ. Eichler, as Keeper of the State Herbarium of South Australia, is much appreciated.

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Note: the author has not consulted the original descriptions of species cited except those that are included among the references of the following list.

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Five new species of *Adenanthos* (Proteaceae) from Western Australia

By A. S. George

Abstract

The following new species of *Adenanthos* are described and their relationships discussed: *A. acanthophyllus* sp. nov., *A. ellipticus* sp. nov., *A. gracilipes* sp. nov., *A. stictus* sp. nov., and *A. teges* sp. nov.

Introduction

Recognition of the following new species of *Adenanthos* arose during preliminary work on the genus towards the Flora of Western Australia. All belong to the Section *Stenolaema* in which all four anthers are perfect.

Notes on Morphology

In *Adenanthos* the zygomorphic perianth is arranged antero-posteriorly so that there is a posticous and an anticous segment and two lateral ones. The anticous one is the broadest, the posticous the narrowest, with the lateral ones intermediate but more similar to the anticous one. They form a tube in the lower half but separate above. Before anthesis, the posticous segment separates to a lower level than the others but may adhere on either side to the adjacent segment, and the style, except for the pollen presenter, emerges on the more deeply split side. The pollen presenter is held until anthesis within the limb, when the latter opens to free it, bearing the pollen. The limb of the anticous segment recurves more than the others, and its anther may reflex against the claw. A ring of straight, erect hairs usually surrounds the base of the perianth, and another surrounds the ovary.

The gender of *Adenanthos*

The name *Adenanthos*, for many years treated as feminine, is here given masculine gender. The International Code of Botanical Nomenclature (1972), Chapter VI Section 2, Recommendation 75A, states:

“Similarly, all modern compounds ending in *-ceras*, *-dendron*, *-nema*, *-stigma*, *-stoma*, and other neuter words should be neuter. The fact that Robert Brown and Bunge respectively made *Aceras* and *Xanthoceras* feminine is immaterial. An exception should be made for names ending in *-anthos* (or *-anthus*) and *-chilos* (*chilus* or *-cheilos*), which ought to be neuter, since that is the gender of the Greek words *anthos* and *cheilos*, but which have generally been treated as masculine and should have that gender assigned to them.”

In Australia most genera of the latter endings are already treated as masculine, e.g. *Acianthus*, *Angianthus*, *Phyllanthus*, *Calochilus*, *Eriochilus*, etc. In order to further settle nomenclature, the Recommendation has been adopted for some time in Western Australia for *Adenanthos* and is followed here. Similarly, the genus *Anigozanthos* is now treated as masculine (Geerinck, 1970, p. 261).

Adenanthos acanthophyllus A. S. George sp. nov.

Derivation of epithet: Greek, *acantha*, a spine or prickle, and *phyllon*, a leaf.

Frutex multicaulis ad 5 m altus cum lignotubero. *Folio* rhombeo-lunata 15–25 mm longa, 18–40 mm lata, profunde trilobata, lobis denue 2–3-lobatis; lobi triangulari-ovati 4–10 mm longi in spinis pungentibus contracti; laminae crassae aliquantum undulatae marginibus planis venatione furcato-reticulata; petiolis teretibus 5–10 mm longis; folia juvenes pubescentes, deinde glabra.

Flores solitarii in pedunculos 3–4 mm longos. *Bractae* ovato-lanceolatae, acutae, 2–8 mm longae, appresso-pubescentes. *Perianthium* 24–28 mm longum limbo acuto 2–3 mm longo, intus glabrum, extus pilis brevibus longisque pubescens. *Antherae* sessiles 2 mm longae. *Squamae hypogynae* oblongae 2·5 mm longae. *Ovarium* breviter pubescens. *Stylus* glaber. *Fructus* fusiformis, obtuso-truncatus, 5–7 mm longus, breviter pubescens.

Type: Nanga Station, on road to Tamala, 5 miles SW of turnoff from Denham road, Western Australia—26°34'S, 113°55'E, 15 July 1973, A. S. George 11671. Holo: PERTH, iso: CANB. K, MEL, NSW, PERTH.

A broad, dense shrub to 3 m tall, occasionally to 5 m, with many stout, erect or spreading stems arising from a lignotuber. Bark smooth, light grey. Branchlets terete, yellowish, pubescent with short curled hairs and a few $\pm$ straight ones, becoming glabrous after a few years. Leaves deeply 3-lobed, each lobe again 2–3-lobed, or when small simply 3-lobed, rarely entire; rhombic to lunate in outline, 15–25 mm long, 18–40 mm wide, the lobes often unequal, triangular-ovate, 4–10 mm long, contracted into a pungent, acuminate spine; lamina $\pm$ undulate, sclerophyllous, margins flat, venation furcate-reticulate, pubescent when young, becoming glabrous; petiole terete, 5–10 mm long, pubescent.

Flowers pale pink and green, solitary, axillary in the uppermost axils; peduncles 3–4 mm long, bearing a few scattered, ovate bracts less than 1 mm. Involucral bracts ovate-lanceolate, acute to acuminate, the outermost 2 mm long, the innermost 7–8 mm, appressed-pubescent. Perianth 24–28 mm long including the limb of 2–3 mm; tube slightly swollen above base, then narrowed to the limb which is acute; tube moderately pubescent with short and long, straight to curled hairs, the limb with mostly long straight hairs; perianth glabrous within. Anthers sessile, 2 mm long, the connective broad, slightly produced, obtuse. Hypogynous scales oblong, 2·5 mm long, shortly united to the perianth. Ovary shortly pubescent. Style glabrous; pollen presenter 2 mm long, flattened on the lower side but the apex laterally compressed, otherwise smooth and rounded, the stigmatic groove terminal.

Fruit fusiform but swollen, obtuse-truncate, shortly spreading-pubescent, with a ring of straight, erect hairs 5–7 mm long around the base. Bracts slightly enlarged about fruit.

Distribution: central west coast of Western Australia: restricted to the southern end of Nanga Station just south of Shark Bay, where it is relatively frequent.

Other collection: type locality, 26 August 1969, A. S. George s.n. (PERTH).

This unusual species differs from all others of the genus especially in the form of its leaves. The only other species with pungent leaves is *A. pungens* Meisn., in which they are divided into terete lobes. *A. acanthophyllus* is much more robust than other species. Its stems are thick and woody, and the whole shrub is quite dense. Only *A. cygnorum* Diels approaches it in the size of the stems, but it is more brittle than the new species.

Geographically the species is of great interest. It is the only *Adenanthos* in the area, the nearest locality for another species being *A. cygnorum* near the Murchison River nearly 150 km to the south. It is also at the northern extremity of the South-West Botanical Province, in an area where several other taxa of unusual interest occur, e.g. *Newcastelia chrysophylla* C. A. Gardn., *Grevillea rogersoniana* C. A. Gardn. and *Eucalyptus roycei* Carr, Carr & George. These and many other species form a tall, fairly dense shrubland on deep red sand.

Adenanthos ellipticus A. S. George sp. nov.

Derivation of epithet: Latin, *ellipticus*, elliptic, in reference to the leaf-shape.

Frutex patenti-ramosus ad 5 m altus sine lignotubero. *Folia* elliptica, 2–5 cm longa, 5–15 mm lata, plana vel concava, plerumque integra, raro apicibus 2–3-lobatis, 3–5-nervata, breviter tomentosa, in petiolis 4–10 mm longis angustata.

Flores axillares in pedunculos graciles 6–12 mm longos. *Bractae* ovato-ellipticae, obtusae, 1–3 longae, pubescentes. *Perianthium* 22–23 mm longum limbo 4 mm longo, intus glabrum praeter pilos longos post antheram, extus pilis brevibus rectis pubescens. *Antherae* sessiles 2.5 mm longae. *Squamae hypogynae* late obtusae, 1.3 mm longae, ad basin cum perianthio connatae. *Ovarium* doliiforme, breviter pubescens. *Stylus* 29–32 mm longus, dimidio supero patenti-hirsuto, ad basin glaber. *Fructus* doliiformis 6–7 mm longus, parce pubescens.

Type: East Mt. Barren, Fitzgerald River National Park, Western Australia—33°55'S, 120°02'E, 9 September 1971, A. S. George 10968. *Holo*: PERTH, *iso*: CANB, K, NSW, PERTH. In spirit collection at PERTH, no. 1310/A.

A rather slender, openly-branched *shrub* to 5 m high, without a lignotuber. *Branchlets* erect or ascending, terete, tomentose with somewhat curled, simple hairs, wearing off after several years leaving a smooth bark. *Leaves* elliptic, mostly 2–5 cm long, 5–15 mm wide (sometimes smaller and narrower); flat, (or concave in upper half), entire or with 2–3 obtuse lobes 1–4 mm long; 3–5-nerved (when 5 the inner 3 more prominent); shortly tomentose with curled, $\pm$ appressed hairs; contracted into a terete petiole 4–10 mm long; a small, yellow-orange gland at the apex of the leaf or each lobe.

Flowers dull pink or red, axillary on slender peduncles 6–12 mm long bearing a few scattered bracts up to 1 mm long. *Involucral bracts* about 4, ovate-elliptic, obtuse, 1–3 mm long. *Perianth* 22–23 mm long at anthesis, including the limb of 4 mm long; tube contracted about ovary, broader above, then narrowed towards the limb; pubescent outside with short, straight hairs, glabrous inside except for silky hairs behind the anther. *Anthers* sessile, 2.5 mm long, connective produced into a short acute appendage. *Hypogynous scales* oblong, obtuse, thin, 1.3 mm long, fused to perianth in lower 3/4. *Ovary* doliiform, shortly pubescent, the long basal hairs slightly exceeding the ovary. *Style* 29–32 mm long, upper half spreading-hirsute, becoming glabrous below. *Pollen presenter* 2.5 mm long, with a slight kink just above the base, almost terete but the apex laterally compressed, obtuse; stigmatic groove terminal.

Fruit 6–7 mm long, doliiform with the truncate apex slightly curved postically; irregularly ribbed, sparsely pubescent, with long hairs about base. Bracts enlarged to 9 mm long in fruit.

Distribution: south coast of Western Australia: restricted to East Mt. Barren in the Fitzgerald River National Park.

Other collections: all from East Mt. Barren: 26 Nov. 1931, W. E. Blackall 1433 and C. A. Gardner 2953; 31 Jan. 1960, A. S. George 572; 21 April 1962, A. S. George 3677A; 25 Oct. 1964, K. Newbey 1451. (All at PERTH)

The affinity of this species is with *Adenanthos cuneatus* Labill. and *A. stictus* A. S. George (see below). However, its leaves are usually entire, have more prominent nervation and lack the small glands over the surface. It is much taller than *A. cuneatus* and lacks a lignotuber which the latter has. *A. cuneatus* also occurs around East Mt. Barren, but the two taxa remain distinct. *A. stictus* is far removed geographically, and though of tall habit is more densely branched than *A. ellipticus*.

Adenanthos gracilipes A. S. George sp. nov.

Derivation of epithet: Latin, *gracilis*, slender, and *pes*, a foot, in reference to the slender peduncles.

Frutex effusus ad 70 cm altus. *Folia* sessilia, 1–3 cm longa, in lobis 3 teretibus angustis divisa, lobi etiam 1-furcati, obtusi, cum glande miniata sub apice, parce appresso-pubescentes, deinde glabra; lobis 3–15 mm longis.

Flores axillares solitariae in pedunculos graciles glabros 3–5 mm longus. *Bracteae* ovatae, obtusae, exteriores 1–2 mm, interiores 3–4 mm longae, fere glabrae marginibus ciliatis, cum glande miniata sub apice. *Perianthium* 17–18 mm longum; unguis fere aequales, extus dense pubescentes, intus glabri; limbus 2.5 mm longus, obtusus, cum glande miniata sub apice, extus dense pubescens, intus cum pilis longis post antherum. *Antherae* 1.5 mm longae, connectivis breviter productis, acutis. *Squamae hypogynae* anguste-ovatae, obtusae, minus quam 1 mm longae. *Ovarium* breviter hirsutum. *Stylus* glaber, 23–25 mm longus.

Type: $\pm$ 65 km E of Lake King, on Norseman road, Western Australia, 15 Sept. 1964, R. H. Kuchel 1817. *Holo*: PERTH, *iso*: AD, CANB, PERTH.

A low, spreading shrub to 70 cm tall. *Branchlets* terete, reddish, appressed-pubescent, becoming glabrous after 1–2 years. *Leaves* sessile, 1–3 cm long, divided for 1/3–1/2-way into 3 terete, narrow lobes, these again often once-forked; lobes 3–15 mm long, obtuse but with a small orange-red gland below the somewhat uncinat apex; sparsely appressed-pubescent with straight hairs, becoming glabrous but slightly scabrous.

Flowers pink, solitary in the woolly, uppermost axils, on slender, glabrous peduncles 3–5 mm long, the latter sometimes bearing a few minute bracts. *Involucral bracts* ovate, obtuse, outer ones 1–2 mm long, the inner 3–4 mm, with a small red gland below the apex, almost glabrous on both sides, the margins ciliate. *Perianth* 17–18 mm long, the tube swollen about the ovary, narrowed above; claws almost equal, densely pubescent outside with straight, spreading hairs, glabrous within; limb 2.5 mm long, obtuse, with an oval red gland on the outer surface below the apex, densely pubescent outside, with a few long hairs inside behind the anthers. *Anthers* 1.5 mm long, the connective shortly produced, acute. *Hypogynous scales* narrow-ovate, obtuse, less than 1 mm long, shortly united to the perianth. *Ovary* shortly hirsute. *Style* glabrous, somewhat flattened in upper half, 23–25 mm long; *pollen presenter* 1.5 mm long, $\pm$ terete but finely ribbed, the apex laterally compressed. *Fruit* not seen.

Distribution: South-Western Australia, between Hyden, Lake King and Salmon Gums.

Other collections: 300 mile peg, Hyden-Norseman road, 26 Oct. 1964, J. S. Beard 3853; sine loc., 1965, W. Rogerson 239. (All at PERTH)

Adenanthos gracilipes is a distinctive species with no very close allies. It is somewhat similar to *A. apiculatus* R.Br. which is of similar, sprawling habit. However the new species has leaves with thicker, widely-spreading lobes, the peduncles are longer and very slender, and the involucre and flowers are different in many respects.

Adenanthos stictus A. S. George sp. nov.

Derivation of epithet: Greek, *stictos*, spotted, in reference to the small glands over the leaf surface.

Frutex ramosus ad 5 m altus ramis erectis vel ascendentibus. *Folia* anguste-ad late-cuneata, 15–35 mm longa petiolis 5–10 mm longis, apicibus 3–6-lobatis lobis triangularibus obtusis 1–4 mm longis cum glandibus miniatis terminalibus; lamina plana, 5–25 mm lata, utrinque sericeo-pubescent tandem $\pm$ glabra, glandibus atro-rufis multis punctata.

Flores axillares, solitariae, in pedunculos 7–13 mm longos. *Bracteae* ovatae 1–3 mm longae, sericeo-pubescentes, obtusae vel acutae, apicibus canaliculatis cum glandibus parvis. *Perianthium* 23–25 mm longum extus hirsutum intus glabrum, limbo 3–4 mm longo sub-acuto extus hirsuto intus post antheram sericeo. *Antherae* 3 mm longae connectivis brevibus. *Squamae hypogynae* cum perianthio pro 1.5 mm connatae, partibus liberis minus quam 1 mm longis, obtuse-lobatis. *Ovarium* breviter pubescens. *Stylus* 29–32 mm longus, ad basin glaber, supra breviter hirsutus, deinde glaber.

Type: $\pm$ 8 miles N of Marchagee on Geraldton Hwy, Western Australia—29°57'S, 116°04'E, 10 Sept. 1970, A. S. George 10379. *Holo*: PERTH, *iso*: AD, CANB, K, MEL, NSW, PERTH, RSA.

A much-branched, grey-green *shrub* to 5 m tall without a lignotuber, the branches erect or ascending. *Branchlets* terete, densely pubescent with $\pm$ straight, appressed hairs, becoming glabrous. *Leaves* narrowly to broadly cuneate, mostly 15–35 mm long including the petiole of 5–10 mm; apex 3–6-lobed, rarely entire when small or with up to 9 lobes in seedling leaves, the lobes triangular, often unequal, 1–4 mm long, obtuse, terminating in a yellow-orange gland; lamina flat, 5–25 mm wide, silky-pubescent on both sides, at length $\pm$ glabrous, dotted with many small dark red-brown glands, more numerous on the upper surface; venation furcate.

Flowers dull reddish-pink and green, axillary, solitary, on slender peduncles 7–13 mm long, the latter bearing scattered, ovate bracts $\pm$ 1 mm long. *Involucral bracts* 4–6, ovate, 1–3 mm long, silky-pubescent, obtuse to acute, the apex canaliculate and tipped with a small orange-yellow gland. *Perianth* 23–25 mm long (including the limb of 3–4 mm), hirsute outside with rather spreading hairs, glabrous inside, the limb sub-acute, hirsute outside, silky inside behind the anther. *Anther* sessile, 3 mm long, connective shortly produced. *Hypogynous scales* united to perianth for 1.5 mm, the free part less than 1 mm long, obtusely lobed. *Ovary* shortly pubescent, the long basal hairs 4 mm long. *Style* 29–32 mm long, glabrous at base, shortly hirsute above, but glabrous towards apex; *pollen presenter* 2–2.5 mm long, scarcely thicker than style apex. *Fruit* 7–8 mm long, oblong but narrowed at apex, obtuse, smooth, sparsely and shortly pubescent, with a basal ring of straight, erect hairs.

Distribution: South-Western Australia, between Coorow and Marchagee, growing in deep sand on heath.

Other collections: W of Coorow, 25 Sept. 1962, J. S. Beard 1933; Marchagee, 14 Jan. 1931, C. A. Gardner s.n.; Watheroo National Park, 7 Oct. 1971, R. D. Royce 9695. (All at PERTH)

Adenanthos stictus is the equivalent on the heaths north of Perth of *A. cuneatus* Labill. on the south coastal heaths. The two are closely related and possibly form a vicarious pair. *A. cuneatus* differs in having a lignotuber; in its lower habit; in the leaves having straight margins and shorter petioles, with a more silky and appressed indumentum which is also more persistent; in the very inconspicuous glands; in the denser, closer, indumentum of the flowers; and in the style having long, spreading hairs as well as short ones. The new growth of *A. cuneatus* is much more red than that of *A. stictus*, and the leaf surface does not wrinkle so much on drying.

Adenanthos teges A. S. George sp. nov.

Derivation of epithet: Latin, *teges*, a mat, in reference to the habit.

Frutex prostratus ad 3 m latus, sine lignotubero. *Ramuli* teretes, dense tomentosi pilibus brevibus longisque crispatis. *Folia* variabilia, ternato-divisa lobis filiformibus teretibus, lateralibus plerumque etiam furcatis; ea ad basin surculorum 6–7 mm longa, supra majora, ad 20 mm longa; ea floralibus simpliciter ternata vel integra, 25–28 mm longa; omnia laxe appresso-hirsuta, cum glandibus miniatis sub apices lorum.

Flores terminales in pedunculos 1–2 mm longos. *Braeteae* triangulari-ovatae, 1–3 mm longae, obtusae, pubescentes. *Perianthium* 15–16 mm longum, extus breviter hirsutum, intus glabrum, limbo acuto 2.5 mm longo extus hirsuto intus post antherum sericeo. *Antherae* 1.25 mm longae, connectivis prominenter et anguste productis. *Squamae hypogynae* ca. 1 mm longae, oblongae, obtusae. *Ovarium* breviter pubescens. *Stylus* 27–28 mm longus, glaber.

Type: North-east of Mundaring Weir, $\pm$ 32 km east of Perth, Western Australia—31°57'S, 116°17'E, 7 December 1973, A. S. George 11758. Holo: PERTH, iso: PERTH, CANB, K, NSW. In spirit collection at PERTH, no. 1523/B.

A prostrate, mat-like *shrub* to 3 m broad, without a lignotuber, the branchlets rarely ascending, not rooting. *Branchlets* terete, densely tomentose with short and long curled hairs, the latter disappearing with age; when young with a few very long hairs also.

Leaves variable, usually ternately divided into filiform, terete lobes, the lateral lobes again once-forked (rarely also ternate); leaves at the base of the annual shoots 6–7 mm, becoming up to 20 mm long above; floral leaves simply ternate or undivided, 25–28 mm long, very slender; all leaves loosely appressed-hirsute with straight hairs (somewhat curled towards leaf base); the longer leaves (especially the floral ones) also with long spreading hairs; each lobe with a lateral orange-red oval gland at the apex.

Flowers 1–4 together on peduncles 1–2 mm long at the end of the branchlets. *Involucral bracts* triangular-ovate, the outermost 1 mm long, the inner 3 mm, obtuse, pubescent. *Perianth* 15–16 mm long, including the limb of 2.5 mm; claws shortly hirsute (more densely in upper half), glabrous within; limb acute, shortly spreading-hirsute outside, with long, coarse hairs inside behind the anthers. *Anthers* 1.25 mm long, connective produced into a prominent, narrow appendage. *Hypogynous scales* a little over 1 mm long, oblong, obtuse, united with perianth in basal third. *Ovary* shortly pubescent. *Style* 27–28 mm long, glabrous, *pollen presenter* 1.25 mm long, the base scarcely compressed, much thicker than the apex of the style, the upper part laterally compressed, with the stigmatic groove set obliquely on the dorsal side of the apex. Fruit not seen.

Distribution: restricted to a few populations on the Darling Plateau, near Mundaring Weir and Chidlow, east of Perth.

Other collections: type locality, December 1969, A. B. Selkirk (PERTH); $\pm$ 2 km north of Chidlow, Western Australia—31°51'S, 116°16'E, 7 December 1973, A. S. George 11759 (PERTH, MEL, RSA).

Adenanthos teges is remarkable for its dense, mat-like habit: the margins of the plant can be lifted almost like a carpet and then replaced on the ground. It was discovered in 1966 by Mr. A. B. Selkirk, of the Forests Department of W.A., who was intrigued by its resistance to burning. During controlled-burning of the forest near Mundaring, this plant not only resisted burning but in doing so protected those plants growing within the margin of the "mats".

The species is allied to *A. cygnorum* Diels and *A. sericeus* Labill. Besides the markedly different habit, it differs from both in the smaller flowers, the indumentum, and the larger glands at the apices of the lobes of the leaves. *A. cygnorum* has thicker leaves, often more divided than those of *A. teges* and occurs on deep sands of the coastal plain north and south of Perth. *A. sericeus* has bright red flowers, and occurs in deep sand or rocky sand of the south coastal heaths from Albany to Israelite Bay. *A. teges* grows in lateritic soils in Jarrah forest (*Eucalyptus marginata* Donn. ex Sm.) in a few localities near Mundaring Weir, east of Perth.

Adenanthos apiculatus R.Br. also is a broad, low shrub, often prostrate but with the ultimate branchlets ascending or erect, and its habit is more open than that of *A. teges*. It has a sparser indumentum on vegetative parts, the leaves becoming glabrous or almost so. The leaf lobes are uncinatate over the sub-terminal glands. The perianth is only 10–12 mm long and is densely hirsute outside including the limb, while the pollen presenter is prominent and laterally compressed. *A. apiculatus* inhabits south coastal sandheaths between Denmark and Cape Riche, extending inland to the Stirling Range.

Reference

GEERINCK, D. (1970)—Revision du genre *Anigozanthos* Labill. Bull. Jard. Bot. Nat. Belg. 40: 261–276.

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